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ANAEMIA OF PREGNANCY AMONG AFRICANS IN NIGERIA

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Severe anaemia frequently complicates pregnancy in Africans as it does in other inhabitants of the Tropics; it is often refractory to treatment, and among the babies born of anaemic mothers the neonatal mortality is high. The management and treatment of these cases are difficult, as their cause is not known with certainty. The frequency with which they were encountered in Nigeria, and the severity of the illness, prompted this investigation into the aetiology, pathology, and treatment of the condition.

Anaemias in Africans

In order that the cases of anaemia forming the basis of this study may be viewed in their proper perspective it is desirable that nutritional anaemias in general and the anaemias of Africans in particular should be briefly reviewed; these form the background against which the investigation was made.

The frequent occurrence of hypochromic microcytic anaemia among Africans has long been noted, and there is a close association between it and the incidence of infection with ankylostomes and schistosomes. Present knowledge regarding this type of anaemia has been reviewed by Trowell (1939).

Nutritional macrocytic anaemias have also been described in Africa, early reports coming from Summerhayes (quoted by Wills, 1932), Trowell (1939), and Anderson and Roberts (1940), while Russell (1941) drew attention to the high incidence of macrocytic anaemia in pregnant women on the Gold Coast. More recently, further studies have been reported (Trowell, 1947; Lehmann, 1949; Beet, 1949). Anaemias similar in type to the African nutritional anaemias have been described in detail in India (Balfour, 1927; McSwiney, 1927; Mackie, 1929; Wills, 1931, 1932, 1933). In a comprehensive review of the subject, Napier (1940) draws attention to the importance of anaemia as a cause of maternal and infantile mortality in that country. By comparison, anaemias in Africans have received less attention, and, as stated by Trowell (1947), "nowhere is the focus clear, and the picture lacks precision." The deficiencies of haematological data relating to Africans have also been commented upon by Beet (1949).

An important contribution to knowledge of nutritional anaemias was made by Fairley, Bromfield, Foy, and Kondi (1938), who described a haemolytic variety of nutritional macrocytic anaemia occurring among pregnant women in Macedonia. The spleen was invariably and the liver frequently enlarged in these cases. Two necropsies were carried out, and in the livers were found marked activity of the reticulo-endothelial cells, passive venous congestion with considerable damage to the parenchymal cells, proliferation throughout the sinusoidal system, and moderate deposition of iron-reacting pigment in the periportal zone—changes attributed to chronic malarial infections. The haemolytic tendency was thought to be due to phagocytosis of newly formed red blood cells by hypertrophied reticulo-endothelial tissue.

The varieties of anaemia occurring among Africans have recently been studied by Foy and his collaborators (1950). They conclude that there are at least four, namely:

(1) Those with hypochromic microcytic blood pictures, no megaloblasts in the bone marrow, acid in the gastric juice, and negative Schumm and indirect van den Bergh reactions. These patients usually have ankylostomes or schistosomes in the faeces, and respond to worming and/or iron therapy.

(2) Those with a normochromic normocytic blood picture, a megaloblastic marrow, and acid in the gastric juice. The serum bilirubin is between 0.5 and 2.5 mg. per 100 ml., and Schumm's test is sometimes positive. These cases respond to liver extracts, pteroylglutamic acid, or "marmite."

(3) Those with a normochromic normocytic blood picture, red-cell counts between 1.5 and 2.5 millions, and a marrow containing no megaloblasts but some giant stab cells. There is acid in the gastric juice, the serum bilirubin is between 0.4 and 0.8 mg. per 100 ml., and Schumm's test may or may not be positive. Such cases respond to liver extracts, pteroylglutamic acid, or marmite.

(4) Macrocytic anaemias with megaloblasts and giant stab cells in the marrow, achlorhydria, a positive Schumm's test, and a serum bilirubin of between 0.9 and 4 mg. per 100 ml. These cases respond to liver extracts, pteroylglutamic acid, and marmite.

To these must be added the anaemia observed to accompany malignant malnutrition or kwashiorkor in young children. This syndrome, first described by Williams (1933), has been the subject of much study in the past 17 years, particularly by Trowell (1949) in East Africa, Gillman and Gillman (1944, 1945a, 1945b, 1945c) in South Africa, and Waterlow (1948) in the West Indies. Present knowledge concerning the syndrome has been outlined by Waterlow (1948) and by Trowell (1949). It is characterized by oedema, dermatoses, hepatomegaly and splenomegaly, disturbed plasma proteins with inversion of the normal albumin/globulin ratio, and by an anaemia which may be of either the normocytic or the macrocytic variety. It has been

suggested by Lehmann (1949) and Trowell (1949) that the macrocytosis in these cases is due to the presence in the peripheral blood of reticulocytes, and that the anaemia is partly due to coincident ankylostome infections.

Among similar cases in which helminthic infections could be excluded Altmann and Murray (1948) nevertheless found anaemia usually normocytic but occasionally macrocytic, and this they concluded was due to protein deficiency and to be an "expression of the generally abnormal metabolism in a malnourished organism." These findings are of considerable importance in connexion with the anaemias in the present study. Trowell (1947) stated that when cases of macrocytic anaemia and dimorphic anaemia in African men and non-pregnant women are investigated in Uganda a large number are found to show one or more of the features of the kwashiorkor syndrome. He further states: "It remains for the future to see if the macrocytic anaemia seen in pregnancy in either the tropical or the temperate regions shows any of these signs of malnutrition; at present there has been almost no investigation along these lines."

The patients in this series were all studied in the hospitals associated with University College, Ibadan, Nigeria, and it seems desirable, therefore, to outline briefly the social and economic background and the habits of the population from which they were drawn.

Social and Economic Background of Population from which Patients were Drawn

The town of Ibadan is situated within the coastal tropical rain-forest belt approximately 40 miles (64 km.) south of its northern fringe; vast tracts of forest in the region have been cleared and the land has been cultivated. The town has become a bustling business and administrative centre of an area from which the principal products are cocoa, maize, cassava, yams, and groundnuts. Of these, the cocoa and most of the groundnuts are exported, and the remaining three form the staple diet of the indigenous population. Meat is expensive, fish very expensive, fresh milk virtually unobtainable, and eggs are scarce. Many Africans will not eat eggs because of religious scruples. The town has grown rapidly in the last 50 years and now with half a million inhabitants has the largest African population of any town in the world. This population is mainly composed of members of the Yoruba, Ibo, and Hausa tribes. The majority of the inhabitants of Ibadan are petty traders, clerks, or labourers, whose respective average weekly income is approximately 10s., £1, and 9s. Almost all live in small mud-walled, tin-roofed huts. By European standards there is gross overcrowding, and sanitary arrangements are primitive.

Polygamy is usual, and wives are procured by payment to the girl's father of a sum of approximately £20. Few can afford this amount without borrowing, and an exorbitant rate of interest is often charged. In many families, therefore, a load of debt absorbs income which might otherwise be spent on food. The possession of several wives is regarded as a mark of prosperity and social distinction, and many accordingly become committed to debts they can ill afford. Under the social code prevailing the husband is required to provide his wives with shelter and food only, and severe economies are often effected at the expense of the latter. It is customary for the wife to undertake some petty trading to augment her needs, but many subsist in poverty and want. A further mark of social distinction is the possession of many voluminous brightly coloured garments, and the budget in poor families is often further strained by extravagant buying in this connexion. The community from which the patients are drawn is therefore poor, and financial distress is aggravated by many of the prevailing social customs.

Methods

On admission patients were examined in detail and the findings recorded, a sample of oxalated venous blood was obtained, and the following examinations made.

The haemoglobin was estimated by the method of King, Gilchrist, and Delory (1944), using an Eel photoelectric absorptiometer. In three cases and for the four estimations made on children of the patients, Sahli's method as described by Whitby and Britton (1946) was employed. Red-cell and white-cell counts were made, using a Bürker–Türk counting chamber. The packed cell volume (P.C.V.) of the blood was determined by the method of Wintrobe (1933a, 1933b), and Schumm's test for methaemalbumin was carried out as described by Fairley (1941). Estimations of haemoglobin red cells and P.C.V. were repeated at intervals of five days. Sternal marrow was aspirated, and marrow and two blood films simultaneously obtained were stained with Leishman's stain. The films were examined for parasites as well as from the haematological viewpoint. Price-Jones curves were constructed in 21 cases, using the method of Price-Jones (1933) and measuring 500 cells. Platelets were estimated by the indirect method, and reticulocytes were stained supravitally with cresyl blue and counted daily throughout the period spent in hospital. The sickle-cell trait was searched for by placing a drop of fresh blood on a slide, covering with a coverslip, ringing with petroleum-jelly, and inspecting at 24-hour intervals for three days. The red-cell fragility was assessed, using standard saline solutions of concentrations ranging from 0.28 to 0.72%.

Plasma was preserved in sealed glass ampoules at 2° C and brought back to the London School of Hygiene and Tropical Medicine, where the proteins were estimated by the Johnston and Gibson (1938) modification of the method of Wu (1922). Van den Bergh quantitative tests were carried out by the method of King (1946); and thymol turbidity tests and the colloidal gold reaction by the methods of McLagan (1944a, 1944b).

In 24 out of the 25 cases a liver biopsy was done. The technique adopted was that described by Gillman and Gillman (1945a), but either a Gillman or a Vim Silvermann needle was used. In five patients the biopsy was repeated when the blood picture, though improved, was still not normal, the interval between the two examinations varying from 10 to 56 days. No untoward sequelae to the biopsies were encountered. The specimens of liver were fixed in 5% formol-saline immediately on withdrawal from the body. Paraffin sections were stained with haematoxylin and eosin; Van Gieson; and for reticulin by Wilder's (1935) modification of Laidlaw's (1929) method. Frozen sections were stained for fat with Sudan III.

The hippuric-acid test of liver function was done in five cases; the method employed was that described by Kolmer and Boerner (1945), 5.9 g. of sodium benzoate being given and the urine collected for four hours. Analyses were made of fasting gastric juice removed before and after the injection of 0.5 mg. of histamine phosphate.

After admission a system of dietary control was established: liver, red meats, and eggs were forbidden, although few patients had been in the habit of consuming more than 1 oz. (28 g.) of meat weekly. Consumption of other protein-containing foods was permitted. A control period of at least five days was allowed to elapse before any treatment was given. Although a longer period would have been preferred, Nigerians, even if very ill, often refuse to stay in hospital

for more than two to three weeks, so that early treatment was essential if its results were to be observed. To follow up Africans after they have left hospital is often impossible; nevertheless a number did attend regularly as out-patients, and their progress was studied. Methods employed in dietary analysis are discussed in the section on the nutritional status of the patients.

Symptoms and Clinical Findings

The commonest symptoms of which the patients complained were lethargy and weakness, these becoming progressively worse as pregnancy advanced. Those with severe anaemia often complained of some dyspnoea and palpitation. Soreness of the tongue and dysphagia were not encountered.

Apart from the clinical evidence of anaemia often clearly apparent, the most outstanding findings were hepatomegaly and splenomegaly. In 16 out of 25 patients the liver reached more than ½ in. (1.25 cm.) below the costal margin during inspiration, while a further three had livers of which the edge only was palpable. In nine the liver reached 3 in. (7.5 cm.) or more below the costal margin. The spleen was palpable below the left costal margin in 19 cases, in three its edge only was clearly felt, in 15 it extended below the costal margin for a distance of 1 in. (2.5 cm.) or more, in eight for 3 in. (7.5 cm.) or more, and in four for 4 in. (10 cm.) or more. Neither the liver nor the spleen was tender in these patients.

No evidence of cardiac failure was detected, and this condition could be excluded as a cause of hepatomegaly and/or oedema.

Oedema of the feet and shins was present only in seven patients, all of whom were pregnant. It disappeared in three of these after delivery, in the other four parturition had not occurred by the time the investigation had to be concluded. In all the patients in whom oedema was observed the plasma proteins were not sufficiently diminished of themselves to account for its presence, so that pressure from the uterus was probably an important causative factor.

Among Africans a yellow colour of the conjunctivae in the regions around the cornea is common, but, as the fornices in these patients are usually clear, the discoloration is due to causes other than jaundice, most probably to local irritation from dust. A slightly yellow tinge in the conjunctival fornices was noticed in three patients, while in a fourth marked jaundice developed.

Among the patients with haemolytic nutritional macrocytic anaemia occurring in pregnancy described by Fairley and others (1938) bronchitis was common; in this series, however, neither it nor other respiratory diseases were encountered. Fissures at the angles of the lips were seen in only three patients, and were probably due to secondary deficiencies not associated with the anaemia. Ulceration of the tongue and buccal mucous membrane was not encountered. No neurological or renal abnormalities were detected.

Obstetric and Neonatal Findings

A remarkable feature of the obstetric history of these patients is the high incidence of twin pregnancies among them. Six out of 21 women who had given birth to children had borne twins, two of them on two separate occasions. Evidence is later brought forward of protein deficiency and liver damage as possible aetiological factors in connexion with the anaemia in these cases. Twin pregnancies, by imposing a more than usually severe drain on available protein, might aggravate both the deficiency and the liver damage.

Of the 25 patients in the series 13 were primiparae, and of the 12 others eight had borne children who died in the first month of life. Mr. J. G. Dumoulin delivered six of these eight patients during the present investigation, and only one of them bore a child who lived longer than 12 days (Table I). Of the patients in the whole series, 18 were delivered during this investigation; there were no obstetric complications, yet only eight of the children born survived the first 12 days of life. It therefore seems that the children of patients with anaemia of pregnancy in Nigeria frequently die in the neonatal period, and series of pregnancies may terminate unsuccessfully in this way.

TABLE I.—*Data Relating to Children of the Present and of Previous Pregnancies*

Case No.	No. of Previous Pregnancies Following which: Child Died in First Month of Life	Child Died at Age of 1–12 Months	Child Lived More Than 1 Year	Present Pregnancy: Duration at Delivery (Weeks)	Child's Neonatal History	Birth Weight of Children: lb.	oz.	kg.
1	3	0	0	30	Died on 6th day	4	3	1·90
2	0	0	0	23	Stillborn	1	11	0·76
3	0	0	0	28	Died on 7th day	Unknown		
4	0	0	0	36	Healthy child	5	6	2·44
5	3	0	0	32	Died on 6th day	4	11	2·13
6	0	0	0	36	Healthy child	5	8	2·49
7	0	0	0	26	Stillborn	2	4	1·02
8	0	1	3	36	Twins: 1 healthy, 1 stillborn	5 4	1½ 2	2·31 1·87
10	1	0	3	24	Stillborn	Unknown		
11	0	1	0	36	Healthy child	6	0	2·72
12	1	0	0	36	Twins: 1 healthy, 1 stillborn	3 Unknown	14	1·76
13	0	1	1	32	Died on 3rd day	"		
14	1	0	0	28	Died on 10th day	3	0	1·36
15	1	0	0	34	Died on 12th day	4	3	1·90
16	0	0	0	36	Stillborn	5	7	2·46
19	0	0	0	36	Healthy child	4	12	2·15
23	0	0	0	36	" "	6	7	2·92
24	0	0	0	36	" "	6	5	2·86
9	1	0	0	Term not reached when patient left hospital				
17	1	0	1					
18	0	0	0					
20	0	0	0					
21	0	1	1					
22	0	0	0					
25	0	0	0					

In Cases 1, 5, 8, 9, 12, and 15 there was a history of twins among the previous pregnancies.

Shaw (1933) gives the following figures as the mean birth weights of 299 East African children:

	Male	Female
First child	6 lb. 11·17 oz. (3·04 kg.)	6 lb. 9·71 oz. (3·00 kg.)
Second child	7 " 4·3 " (3·30 ")	6 " 15·7 " (3·16 ")
Third and subsequent children	7 " 4·4 " (3·30 ")	6 " 15·6 " (3·16 ")

Reference to Table I reveals that, compared with these, all the 18 women delivered bore infants of whom the birth weight was abnormally low, and half the pregnancies terminated prematurely. Figures for Nigerian children are not available.

In four of the healthy children born at term the haemoglobin and red blood cells were estimated. The values obtained were:

	Haemoglobin	R.B.C.s
Child of Case 4	10.51 per 100 ml.	3·5 millions per cmm.
" " " 6	18·25 " " " "	5·1 " " "
" " " 11	14·60 " " " "	5·0 " " "
" " " 12	17·52 " " " "	6·4 " " "

With the possible exception of the child of Case 4 there is no evidence of anaemia in the offspring of these anaemic mothers.

Nutritional Status of the Patients

Signs of gross malnutrition as indicated by severe wasting or symptoms of a clear-cut deficiency disease were not encountered among the patients in this series or indeed among the adults in the hospitals in Ibadan at the time of the study. Approximately one-half of the children admitted, however, were suffering from malignant malnutrition, and one of the commonest conditions seen in adults in the medical wards of the hospitals was cirrhosis of the liver with or without ascites. As the result of work by Himsworth (1950), Gillman and Gillman (1945b, 1945c), Gillman *et al.* (1945), Trowell and Muwazi (1945a, 1945b), Waterlow (1948), and others it is now generally believed that diffuse fibrosis of the liver in the Tropics is most commonly produced by a diet deficient in protein. There was good reason to suspect, therefore, that the diets of the local inhabitants were deficient in protein but contained enough carbohydrate to prevent marked wasting. Unfortunately, a weighing machine did not become available till the last few days of the investigation, and only the patients referred to in Table II could be weighed.

TABLE II.—*Heights and Weights of Seven Patients*

Case No.	When Weighed	Height		Weight	
		ft. in.	cm.	lb.	kg.
1	2 months after delivery	5 2	157	97	44
3	2½ ,, ,, ,,	5 1½	155	86	39
5	2 ,, ,, ,,	4 11½	152	104½	47·4
18	7th month of pregnancy	4 11½	151	103½	46·9
20	5th ,, ,, ,,	5 0	152	108	49
22	8th ,, ,, ,,	5 0	152	127	57·6
25	7th ,, ,, ,,	5 2	157	111	50·3

Height and weight standards for healthy women in Nigeria are not available, but those for Gambia were found by Dean Smith (1950, personal communication) to be: height, 5 ft. 2.1 in. (157 cm.), standard deviation ±1.76 in. (4.4 cm.); weight, mean 115 lb. (52.2 kg.), standard deviation ±15.9 lb. (7.2 kg.). Green-Armytage and Dutta (1936) found that pregnant women in India seldom increase much in weight during the first three months, but from that time till term an increase of 16–20 lb. (7.3–9.1 kg.) is to be expected, or approximately 3 lb. (1.4 kg.) a month. If for each month of pregnancy subsequent to the third 3 lb. (1.4 kg.) is deducted from the weight given in Table II it is seen that Cases 5, 20, and 22 come into the lowest portion of the normal range while the remainder are distinctly though not grossly underweight. In Cases 5, 18, 20, and 22 growth appears to have been stunted.

The diets of the patients were studied, and in 13 cases all food eaten in hospital during a 1–4 days' period was weighed. The hospitals did not supply meals to patients, and these were therefore brought thrice daily by relatives. Although there is reason to believe that persons in hospital are in this way given rather more to eat than they would obtain in their own homes, the amounts are a useful guide to the individual's normal diet. The staple foods in this region—namely, maize pap, yams, and gari made from cassava—are all prepared according to recipes which do not vary materially from family to family. These recipes were procured and from them the quantities of the basic ingredients determined. With the aid of the tables compiled by Platt (1945), the protein and carbohydrate contents of these ingredients were calculated. Fat was not estimated, as without the imposition of special ill-tolerated conditions considerable inaccuracies would result from the patients' eating habits. A quantity of oil, sometimes enough for several days, is kept, and into this portions of food are dipped during the meal. Oil being relatively expensive, the amounts used in this way and also added in cooking vary with the financial status of the individual. The fat content of popular dishes therefore cannot be accurately assessed from standard recipes. The amount of protein and carbohydrate consumed daily is shown in Table III. The daily protein intake recommended for

TABLE III.—*Constituents of the Diets of 13 Patients*

Case No.	Daily Protein Consumption (g.)	Daily Carbohydrate Consumption (g.)	Total Calories Provided by Dietary Protein and Carbohydrate	No. of Days Food Weighed
5	38	362	1,600	2
6	66	390	1,824	1
9	65	626	2,764	2
11	63	727	3,160	2
13	69	619	2,752	2
14	86	716	3,208	2
17	26	216	968	2
18	55	513	2,272	2
20	56	480	2,144	2
21	47	396	1,772	4
22	73	591	2,656	2
24	56	358	1,656	3
25	40	315	1,420	2

pregnant women by the Food and Nutrition Board of the National Research Council (U.S.A.) is 85 g., or 1.5 g. per kg. of body weight, and of this it is suggested that one-half to three-quarters should be of animal origin. The dietary history of these patients revealed that they never had more than 1 oz. (28 g.) of meat or fish a day, and only the exceptions among them had more than 1 oz. (28 g.) every three to four days. Several stated that they normally had only one piece weighing about 1 oz. (28 g.) weekly. Most of the dietary protein was supplied by maize. This is deficient in tryptophan and lysine, without which essential amino-acids it is probable that some of the protein ingested could not be utilized by the body. There seems to be little doubt that all the patients in this series were living on a diet grossly deficient in animal protein, and markedly deficient in non-animal protein. Clinical evidence points to such deficiencies being common among the general population of Nigeria.

The fat content of the diets of these patients probably averages not more than 30 g. a day and therefore provides approximately 270 calories. If this figure is added to the calories provided by protein and carbohydrate shown in Table III, an approximation to the total daily calorie value of the diets is obtained. Nicholls (1938) has recommended that the diet of pregnant women in the Tropics should supply 2,800 calories daily. The Committee on Foods of the National Research Council (U.S.A.) (*Bull. nat. Res. Coun., Wash.*, 1945) gave 2,500 as the minimum figure. If the former recommendation is accepted, then reference to Table III shows that 8 of the 13 patients whose diets were analysed have an inadequate calorie intake; if the latter standards are accepted seven are inadequate. Except in one patient (Case 17), who was very ill and suffering from anorexia, the deficiency of calories is not gross—a finding which accorded with the general appearance of the patients.

Wilson and Mitra (1938) surveyed the diets of a section of the population of Assam among whom nutritional anaemias in pregnancy were common. Their findings were almost identical with those in the present survey.

Haematological Data

The following values were found at initial examinations of patients in the series. As one patient was not seen till convalescent the figures for that case are excluded. *Haemoglobin*: mean, 5.7 g./100 ml.; range, 2.66–8.7 g. *Red blood cell count*: mean, 1.58 millions per c.mm.; range, 0.59–3.04 millions. *Mean corpuscular volume* (M.C.V.): mean 91.1 μ^3; range, 74.9–120.4 μ^3. *Mean corpuscular haemoglobin concentration* (M.C.H.C.): mean, 32.01%; range, 26.6–38%. *Mean corpuscular haemoglobin* (M.C.H.): mean, 28.7 $\mu\mu$g.; range, 21.9–36.2 $\mu\mu$g.

The anaemias can be divided into three main groups as follows:

Group 1.—Microcytic and Hypochromic: M.C.V. less than 82 μ^3 and M.C.H.C. less than 32%—two cases.

Group 2.—(a) Normocytic and Hypochromic: M.C.V. 82–95 μ^3, M.C.H.C. less than 32%, four cases. *(b) Normocytic and Normochromic:* M.C.V. 82–95 μ^3, M.C.H.C. 32–38%—11 cases.

Group 3.—Macrocytic: M.C.V. greater than 95 μ^3—seven cases.

It is apparent that anaemias of pregnancy in Nigeria do not form a homogeneous group. If an M.C.H.C. value of below 32% is taken to indicate hypochromia then hypochromia is encountered among macrocytic, normocytic, and microcytic anaemias. Fairley *et al.* (1938) found a similar position among nutritional macrocytic anaemias in pregnant women in Macedonia, while Wintrobe (1932) and Britton (1936) pointed out that in pernicious anaemia the M.C.H.C. is often lower than normal. The various absolute values for the anaemias of malnutrition in infants studied by Altmann and Murray (1948) were not dissimilar from those in the present series.

The reticulocyte counts in patients first seen before delivery and before treatment had been given were: Group 1 (microcytic and hypochromic), mean 1.2%; Group 2a (normocytic and hypochromic), 2.3%, range 0.5–4.1%; Group 2b (normocytic and normochromic), 1.9%, range 0.5–4.2%; Group 3 (macrocytic), 4.2%, range 3.0–7.0%.

A reticulocyte crisis may occur spontaneously in the puerperium, so that figures from patients first seen then are excluded.

The platelets were significantly reduced in all groups, mean 228,000 per c.mm., range 72,000–350,000 per c.mm. This finding accords well with that of Fairley *et al.* (1938) in cases of nutritional anaemia in pregnant women in Macedonia. In that series thrombocytopenic purpura was observed in approximately 25% of the patients; in these it seems the platelet count was below 55,000 per c.mm. Neither platelet counts as low as this nor purpura were observed in this study.

The white blood cells were reduced to 5,000 per c.mm. or less in 11 cases. Again similar changes were observed by Fairley *et al.* (1938). The reduction in these patients not only of the red cells but of the white cells and platelets they attributed to a panmyelopathy.

The sickle-cell trait was found in 3 out of 19 cases. These were divided equally among the three types of anaemia, and, apart from the presence of the trait, the clinical, haematological, and pathological characters in these cases and their response to treatment did not differ from those of the other members of their group—points suggesting that the presence of the trait was an incidental finding only and was not aetiologically related to the anaemia.

The red-cell fragility was determined in 14 cases. All were within the normal range.

The sternal marrow was examined in 23 cases. The almost universal appearance was one of hyperplasia of the myeloid elements with a macro-normoblastic picture. True Ehrlich megaloblasts were observed in only two cases, though there were many cells which resembled megaloblasts very closely. There appeared to be little correlation between the marrow findings and those in the peripheral blood, and in this respect as well as in the prevalence of the macro-normoblastic appearances these cases are strikingly similar to those of malnutritional anaemia in infants studied by Altmann and Murray (1948). This dissociation between the marrow and the peripheral blood picture has also been reported by Foy *et al.* (1950).

Price-Jones curves were constructed for 21 cases. In each, 500 cells were measured. A shift to the right and broadening of the base was present in 13, a shift to the left was found only in one case—one of the two in Group 1. A broad base in a centrally placed curve was found in seven cases. No normal curves were obtained. Typical curves are shown in Figs. 1 and 2.

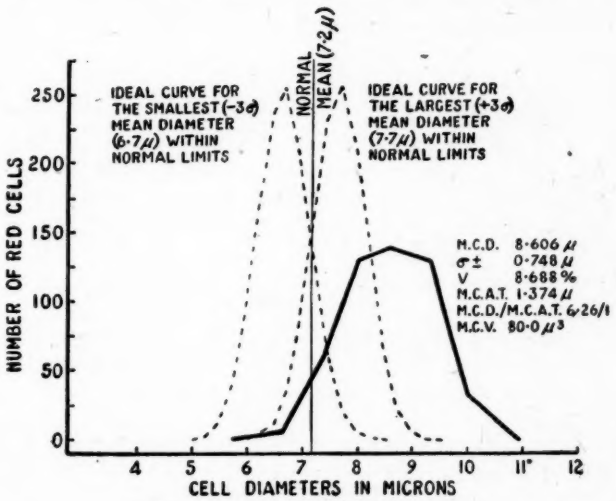
NORMAL MEAN (7·2 μ)
IDEAL CURVE FOR THE SMALLEST (-3σ) MEAN DIAMETER (6·7 μ) WITHIN NORMAL LIMITS
IDEAL CURVE FOR THE LARGEST (+3σ) MEAN DIAMETER (7·7 μ) WITHIN NORMAL LIMITS
M.C.D. 8·606 μ
σ± 0·748 μ
V 8·688%
M.C.A.T. 1·374 μ
M.C.D./M.C.A.T. 6·26/1
M.C.V. 80·0 μ³
NUMBER OF RED CELLS
CELL DIAMETERS IN MICRONS

FIG. 1.—Typical Price-Jones curve.

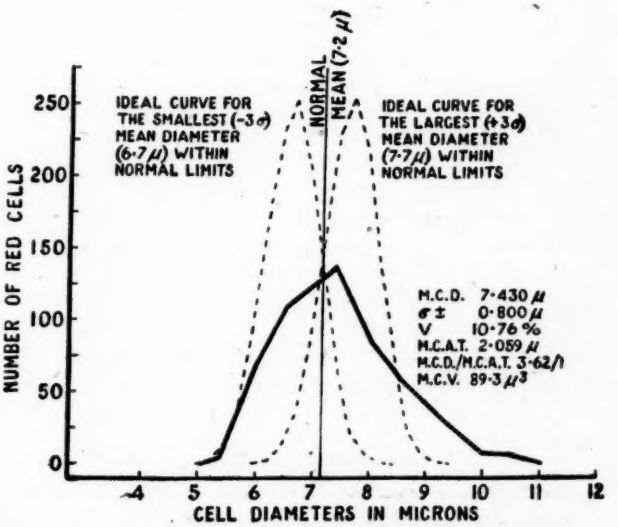
NORMAL MEAN (7·2 μ)
IDEAL CURVE FOR THE SMALLEST (-3σ) MEAN DIAMETER (6·7 μ) WITHIN NORMAL LIMITS
IDEAL CURVE FOR THE LARGEST (+3σ) MEAN DIAMETER (7·7 μ) WITHIN NORMAL LIMITS
M.C.D. 7·430 μ
σ± 0·800 μ
V 10·76%
M.C.A.T. 2·059 μ
M.C.D./M.C.A.T. 3·62/1
M.C.V. 89·3 μ³
NUMBER OF RED CELLS
CELL DIAMETERS IN MICRONS

FIG. 2.—Typical Price-Jones curve.

The mean corpuscular diameter (M.C.D.) (normal 6.7 μ to 7.7 μ, average 7.2 μ, Whitby and Britton, 1946) was in the upper half of the normal range in all but three cases and greater than normal in 11 cases, range 7.068 μ–8.606 μ. The standard deviation of the M.C.D. (σ) and the coefficient of variation (V) were increased in all cases, the range for the former being 0.6 μ–1.08 μ (normal 0.4 μ–0.5 μ, Price-Jones, 1933), and for the latter 7.74%–14.67% (normal 5.3%–7.3%, Price-Jones, 1933).

The mean corpuscular average thickness (M.C.A.T.) (normal 1.7 to 2.5 μ, Price-Jones, Vaughan, and Goddard, 1935) was in the lower half of the normal range in 18 cases, below 2.0 μ in 11 cases, and below 1.7 μ in three cases, the range being 1.374 μ–2.486 μ. The ratio of M.C.D. to the M.C.A.T. has been shown (Haden, 1935) to average 3.4/1 in healthy persons, the normal range being 2.4/1 to 4.2/1. A value of more than 4.2/1 indicates an abnormally flat cell. In the present series the mean value was 4.04/1, range 3/1 to 6.26/1. In 18 cases the value was greater than 3.4/1 and in six cases greater than 4.2/1.

These findings are of special interest in view of the work of Larsen (1948), who found the red cells in acute and chronic hepatitis to be abnormally broad and thin, the M.C.V. in such patients often being normal, and the standard deviation of the M.C.D. increased.

The Gastric Juice

This was examined in 23 cases; in 15 of these free acid was present after histamine, while a histamine-fast achlorhydria was found in eight. Both patients who had a megaloblastic marrow had achlorhydria. Achlorhydria appeared to be equally common in the macrocytic and normocytic groups.

Stool Findings

Stools were examined in 23 cases. Sixteen patients were found to be infected with *Ascaris lumbricoides*, four with *Trichuris trichuria*, and four with *Ankylostoma duodenale*. Infection with the two former worms has not been reported as a cause of anaemia, and from the haematological viewpoint may be ignored. In this series it is considered that ankylostomiasis is also unrelated to the anaemia. This view is based on the following facts: (1) That in only 4 cases out of 23 was the infection present. (2) Those infected were distributed in a random way among the normocytic and macrocytic groups, whereas the anaemia produced by ankylostome infections is typically microcytic. (3) Of the four patients infected two were given anthelmintic treatment immediately on admission, yet the anaemia did not materially improve. (4) Of the other two cases the anaemia in one rapidly improved after delivery and in the other some improvement with marmite was obtained before delivery. No attempt was made to expel the worms in either case until investigations of the anaemia were concluded.

Cysts of *Entamoeba histolytica* were present in only one case and the anaemia responded satisfactorily before anti-amoebic treatment was given.

Evidence of Malaria

Overt malaria was not detected in any of the patients, although blood slides were examined from them all. None complained of symptoms suggestive of malaria, though the region in which they live is highly malarious. The absence of clinical evidence of malaria and of parasitaemia demonstrable by examination of blood films suggested that malarial infections, if present, were unlikely to be severe enough to cause anaemia, though they may have added to the strain on the blood-forming tissues.

Evidence of Syphilis

The high incidence among the patients in this series of hepatomegaly and of pathological changes in the liver as revealed in the biopsy material rendered it necessary to exclude syphilis as an aetiological factor. No clinical evidence of the infection was detected by examination of the nervous, cardiovascular, or other systems, and the Kahn test was positive in only one case out of 21 in which it was done. The anaemia in this patient underwent a spontaneous remission after delivery and before any antisyphilitic treatment was given. There is no evidence, therefore, that syphilis is responsible for the anaemia or the condition of the liver in these patients

Biochemical Data

The van den Bergh test was done in 15 cases, and only in two was the bilirubin content of the serum significantly raised.

Schumm's test was positive in 16 out of 24 cases. Positive reactions were found among all types of anaemia. The test has been demonstrated by Fairley (1941) to be a very sensitive index of intravascular haemolysis, so that this process seems to occur in some cases of all types of anaemia of pregnancy encountered in this study.

Plasma Proteins.—In view of the evidence of dietary protein deficiency and of liver damage in the patients the plasma proteins were determined as often as possible. They were fractionated and estimated individually in 15 cases, while only the total was determined in a further seven instances. The totals were found to be within normal limits in all but one case, in which it was reduced (range 4.9–8.7 g. per 100 ml.) but an outstanding feature of the values was the almost universal increase in the globulin fraction (range 2.6–4.7 g. per 100 ml., mean 3.64 g. per 100 ml.). The other values, expressed in grammes per 100 ml., were albumin, mean 3.48, range, 2.2–4.1; fibrinogen, mean, 0.48, range, 0.1–1.2. Expressed in grammes per 100 ml., Harrison (1947) gives the following as the normal figures for the plasma proteins: Total, 5.8–8.8; fibrinogen, 0.20–0.40; albumin 3.4–6.7, average 4; globulin 1.2–2.9, average 2. albumin/globulin ratio (A/G), 4/1 to 1.2/1, average 2/1. If these standards are accepted, then of the 15 patients in whom estimations were made the albumin fraction was below the average in 13, the globulin above the average in all, and the globulin values were greater than those of the normal range in 11 cases. The A/G ratio was below the normal range in 11 cases (range 0.58/1 to 1.48/1. mean 0.99/1). Similar protein values were noted by Holmes (1945) in a study of oedema in nutritional macrocytic anaemia, while a fall in plasma albumin and rise in globulin has been reported in liver disease by many authors, notably Filinski (1922), Post and Patek (1942), Higgins *et al.* (1944), and Maizels (1946)

Liver Pathology

Histology

A specimen of liver was obtained by biopsy in 24 patients. In the paraffin sections stained with haematoxylin and eosin the outstanding features were that in many sections the cytoplasm of the parenchymal cells was pale, and there was an obvious increase in fibrous tissue within the portal tracts and also a considerable amount of pale staining material between individual liver cells (Fig. 3). In places, embedded in this substance, were small round cells which were perhaps lymphocytes. The appearance after special staining suggested that much of the material was reticulin. Two sections were treated with Best's carmine at the suggestion of Dr. D. S. Ridley; the pale cells were then seen to be loaded with glycogen granules. Waterlow (1948)

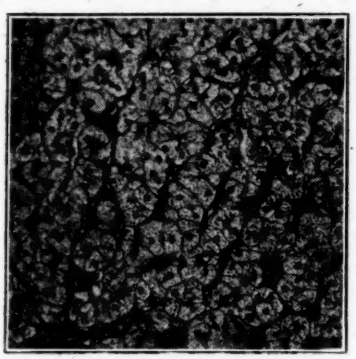

FIG. 3.—Liver section from Case 23. (Stain haematoxylin and eosin.) The parenchymal cells are pale, and between many of them are clumps of material containing reticulin. (×200.)

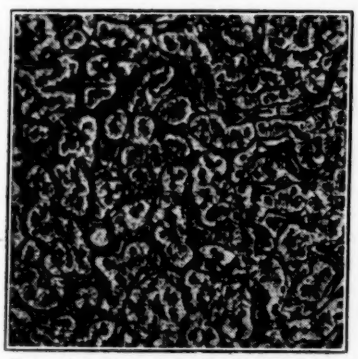

FIG. 4.—Case 3. Section showing diffuse increase in reticulin network between parenchymal liver cells. (×200.)

found large amounts of glycogen in the livers of infants suffering from malignant malnutrition.

When stained by Wilder's method almost every section showed some increase in reticulin fibres. Exceptions were three cases in which the anaemia was among the least severe of any in the series. Little increase in reticulin was found in two other patients whose anaemia also was not severe. In the remainder a mild or moderate degree of diffuse fibrosis was present (Fig. 4). Strands of reticulin between individual liver cells were increased in thickness and number, often appearing like the ends of teased-out rope, while in the portal tracts and around the central veins of the liver lobules the tissue was invariably increased. In those patients in whom the biopsy was repeated the second samples did not materially differ from the first. The longest interval between the two, however, was only 56 days.

In seven patients fatty infiltration of the liver was demonstrable in frozen sections stained with Sudan III. In two the infiltration was mild or moderate (Fig. 5), but uniformly distributed in the periphery of the liver lobules. In the remaining five cases only a few scattered cells were affected.

In almost all of these anaemic patients, therefore, there was either fibrosis or fatty infiltration of the liver. It is difficult to ascertain how long the fibrosis had been present, but Dr. J. C. Waterlow, who kindly examined a number of sections, thinks the appearance more consistent with a long-standing than with a recent infiltration of fibrous tissue.

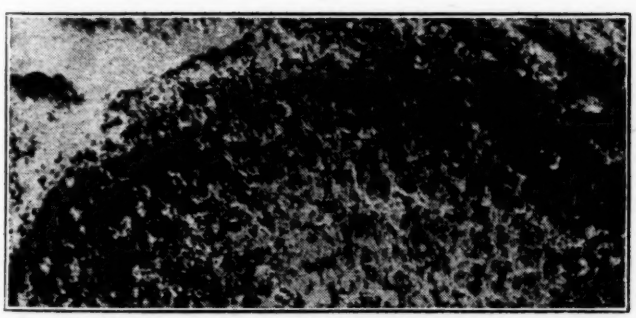

FIG. 5.—Fatty degeneration of the periphery of liver lobule. Frozen section stained with Sudan III and methylene blue. (×120.)

Biochemical Tests of Liver Function

As a guide to liver function the thymol turbidity, colloidal gold, and hippuric-acid tests were carried out whenever possible.

The thymol turbidity test was performed in 19 cases; in these it was positive in 11 and at the upper limit of the normal range (0–4 units) in a further three.

The colloidal gold reaction was done alongside the thymol turbidity test; the results confirmed those of the latter. In no case was a positive reaction obtained in one and a negative in the other.

The hippuric-acid test was carried out in five cases, and was positive in them all. In four hours the normal excretion by women is 3.36–5.5 g., amounts below 2.5 g being distinctly abnormal (Harrison, 1947). Amounts of hippuric acid in grammes excreted in four hours by these patients were, respectively, 1.90, 2.30, 1.23, 2.20, and 2.25.

Course of the Anaemia

It was found that the anaemia is most likely to develop in the last three to four months of pregnancy. It may improve with rest and with increase in the protein content of the diet; and it had a distinct tendency to remit spontaneously after delivery.

Treatment

In all types of case the results of treatment before delivery were disappointing, while, in the puerperium, assessment of the therapeutic efficiency of different substances was largely invalidated by the natural tendency to remit.

In the microcytic group iron given before delivery failed to evoke a reticulocyte crisis.

In the normocytic group deworming, "marmite," folic acid, iron, and vitamin B_{12} similarly failed during pregnancy. Marmite was given in doses of 3 oz. (85 g.) daily for 15 and 8 days respectively to two patients, but no reticulocyte crisis or increase in the red blood cells or haemoglobin occurred. In other cases folic acid in doses of 20 mg. daily for six days failed, as did ferrous sulphate in doses of 3 gr. (0.2 g.) thrice daily. In another case a single injection of 80 μg. of vitamin B_{12} ("cytamen") was given without response.

Among those with macrocytic anaemia, two patients had natural remissions after delivery, another was given 3 oz. (85 g.) of marmite daily for 10 days during the puerperium, and another received 100 μg. of vitamin B_{12} (cytamen) intramuscularly six days after delivery. All improved at approximately the same rate. One patient had failed to respond to iron given during pregnancy, though her M.C.H.C. was only 26.6%. Two patients were given vitamin B_{12} during pregnancy in doses of 100 μg. and 120 μg. respectively. No significant response to treatment occurred in one, though small increases in the reticulocyte count and haemoglobin were observed in the other. Large doses of vitamin B_{12} were used, as Patel and Kocher (1950) suggested that some of the reports of ineffectiveness of vitamin B_{12} in macrocytic anaemia of pregnancy and the puerperium were due to the use of too small a dose. The amounts here employed were respectively 10 and 12 times greater than those producing maximal responses in Addisonian anaemia. In both cases folic acid was also ineffective. Two patients who were critically ill on admission were each given a transfusion of 1½ pints (850 ml.) of blood to help them over this period. After

parturition the anaemia improved rapidly. Another patient, after deworming and a control period lasting 21 days, was given 3 oz. (85 g.) of marmite daily. Over the ensuing eight days the reticulocytes rose 4%, the red cells 0.6 million per c.mm., and the haemoglobin 1.45 g. per 100 ml.

The two patients with megaloblastic bone marrows were first seen on the day on which they were delivered. They were ill and had haemoglobin values of 2.66 and 4.48 g. per 100 ml. respectively. Both were treated immediately—one with liver extract, the other with marmite. They developed satisfactory reticulocyte responses and made good recoveries.

This group of macrocytic anaemias in pregnancy appear to be different from those of the temperate zone in their failure to respond to folic acid, as regards the marrow findings, and in the presence of methaemalbumin in the circulating plasma, though in their response to vitamin B_{12} they are similar to those reported by Ungley and Thompson (1950).

Napier (1940) stated that "anaemia of pregnancy is amenable to suitable treatment in the early months of pregnancy and in some cases in the later months, but in the majority it is only possible to stop or slow down the deterioration of the blood picture until after parturition." For the macrocytic variety of anaemia in pregnant Nigerian women this statement still appears to hold good in spite of the advent of vitamin B_{12} and folic acid.

Discussion

The outstanding features of these cases of anaemia in pregnancy appear to be the high incidence among them of liver damage, a haemolytic tendency, a disturbance of the plasma proteins, and an increase in the diameter and a decrease in the thickness of the red blood cells, with a shift to the right or a broadening of the base of the Price-Jones curve. The diets of the patients are deficient in protein but only mildly deficient in carbohydrate. The increase in the diameter of the red cells was noted even in anaemia which, when judged by the M.C.V. alone, would be classed as microcytic. The anaemias in the series have so many points in common that, even though the M.C.V. varies, it seems possible that they have certain similar aetiological features.

Macrocytic anaemia with haemolytic features associated with liver disease was described by Davidson and Fullerton (1938), though anaemia in patients with cirrhosis of the liver is more common, and was recognized by Wintrobe (1933a, 1933b). Since that time several accounts have been published, and Wintrobe (1936) reviewed 132 cases. Jarrold and Vilter (1949) state that such patients usually have not a megaloblastic but a macro-normoblastic marrow. Coleman (1948) described further cases of haemolytic anaemia in liver disease. The occurrence, therefore, of haemolytic features in patients with anaemia in pregnancy and liver damage takes on a fresh interest when viewed against the background of this work. Larsen (1948) finds that the standard deviation of the M.C.D. is invariably increased in patients with liver damage, and both he and Himsworth (1950) state that the cells in these cases are abnormally broad and thin, so that the M.C.V. may be within the normal range—findings in common with those of the present series.

Himsworth (1950) further points out that growth, by imposing on the body demands for protein, may result in hepatic injury in childhood and pregnancy. He states (p. 97) that "if rats are given a diet containing just sufficient casein and choline to prevent fat accumulating in the liver, and then allowed to become pregnant, gross fatty infiltration of the liver develops. After parturition the fat content returns to normal." It seems at least possible that such a mechanism is at work in the patients studied in this investigation. Some of them no doubt begin pregnancy with livers damaged in childhood by malignant malnutrition and ensuing diffuse fibrosis, while in others living on a protein-deficient diet pregnancy is the final stress leading to fatty infiltration and/or fibrosis with disturbance of liver function. This process probably in part explains the development of anaemia which the work already referred to has shown to occur in patients with liver damage.

The other main factor concerned is protein deficiency. This of itself may cause anaemia. Himsworth and Glynn (1944) have demonstrated this experimentally in animals deficient in methionine when a macrocytic anaemia with macro-normoblastic marrow developed. As protein deficiency may also damage the liver some interplay of these two factors seems highly probable. Parasitic infections, including malaria, may impose a further drain on the patient's available protein. Liver damage and dietary protein deficiency both appear to be common among the population from whom these patients were drawn. Hepatic enlargement, however, was very much more common among these anaemic patients than among non-anaemic pregnant women in Ibadan. Splenic enlargement in these patients may in part be due to chronic malaria, but it is more probably associated with the liver damage. Himsworth (1950) has discussed this point in detail, and it seems possible for the spleen to enlarge as the result of liver damage with or without portal hypertension. The conclusion tentatively suggested from the findings in this investigation is that dietary protein deficiency, liver damage, the demands of pregnancy, and particularly of twin pregnancies, impose a combined strain on bodily metabolism of which the development of anaemia is a result.

This hypothesis would explain the failure to exert any therapeutic action in these cases of known haemopoietic substances, including vitamin B_{12}, folic acid, and liver extract in normal doses, the disturbance of blood formation and the development of macrocytosis here being the result of protein lack and liver damage. There is no evidence of any deficiency of haemopoietic principle. It is possible that the very large doses of liver extract found effective by some workers may benefit the anaemia through the action on a damaged liver of their contained protein and lipotrophic substances. Marmite, too, may perhaps owe some of its therapeutic efficiency to its known content of lipotrophic substances rather than to the extrinsic haemopoietic factor which it contains.

The possible relationship of this type of anaemia of pregnancy in the Tropics to those of pregnancy in the temperate zone, cirrhosis of the liver, so-called Banti's disease, and particularly to haemolytic anaemia occurring in association with liver disease, appears to be worthy of further investigation. There seem to be good grounds for believing that the anaemias of pregnancy in Nigeria are related to those found in malignant malnutrition or kwashiorkor.

The most helpful therapeutic measure in these patients once the latter months of pregnancy have been reached

appears to be blood transfusion, repeated as required until natural remission takes place after parturition. The patient should be given a high protein diet supplemented by 2 to 3 oz. (57 to 85 g.) of marmite daily—a preparation which the African takes with relish.

To make pregnancy safe for tropical peoples and to prevent the occurrence of these anaemias, the aim must be an adequate diet, particularly during the years of growth and child-bearing, so that at neither of these periods does the liver become damaged or protein deficiency develop.

Summary

Anaemia in pregnancy in Nigeria is often encountered among those living on a protein-deficient diet.

There is a marked tendency for labour to be premature in these cases, and the neonatal mortality is high.

The anaemia is characterized by an increase in the diameter of the red blood cells, and diminution in their thickness. A haemolytic tendency is common.

The patients frequently have enlarged livers and spleens.

The bone marrow almost invariably shows a macronormoblastic picture.

The total plasma proteins are normal, though the globulin is usually increased.

Liver biopsy has shown the liver to be diffusely fibrosed in many cases and infiltrated with fat in others.

Biochemical tests reveal an impairment of liver function.

The anaemia tends to become most severe in the last three months of pregnancy and to remit spontaneously after parturition.

It is usually refractory to treatment before parturition. The therapeutic measures that seem most useful, however, are a high protein diet and blood transfusion, repeated as necessary till the natural remission develops.

In pregnant women in the Tropics a vicious circle may be established by the demands of the foetus for protein aggravating the effects of dietary protein deficiency and liver damage due to protein deficiency. It is suggested that anaemia of the type described is the result of this process.

It is a pleasure to express my gratitude to Mr. J. G. Dumoulin for referring to me patients with anaemia under his care, to Professor G. R. Cameron, Dr. D. G. Ridley, and Dr. J. C. Waterlow for their comments on the liver sections, to Professor F. Murgatroyd for his helpful suggestions, to Professor B. S. Platt and Dr. J. Walters for their help, and to Dr. Ridley for his comments on the marrow films. For technical assistance I am grateful to Mrs. I. Cameron, Mr. L. E. Pettitt, Mr. J. C. Brunt, Mr. W. T. Bush, Mr. A. Paterson, M. A. Ali, Miss Y. M. Clayton, my wife, and the nursing staff of University College Hospital, Ibadan; without their help at varying stages the investigation could not have been carried out. For information relating to local foods I am indebted to Mr. A. Adelaja.

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Each month the United States Information Services issue a medical newsletter prepared by the American Medical Association as a guide to developments in American medical research. The November copy is an eight-page quarto booklet containing abstracts on 10 different subjects. A brief mention of four items will show the scope of the newsletter. The first note describes the treatment of lobar pneumonia with bacitracin, an antibiotic produced by a strain of *Bacillus subtilis*, and suggests that it is effective against pneumococcal pneumonia, though toxic to the kidneys (*Annals of Internal Medicine*, May, 1951). The second (*Annals of Allergy*, May, 1951) suggests that khellin may have a useful place in the treatment of bronchial asthma, particularly in patients with hypertension. Khellin is obtained from a plant known in Arabic as khella and in English as bishop's weed, and belongs to the carrot family. A report from the *International Journal of Leprosy*, March, 1951, discusses the somewhat limited value of streptomycin and dihydrostreptomycin in treating leprosy. Fourteen patients with hepatic insufficiency, with onset of coma, were treated with large doses of aureomycin, and eight showed definite improvement. The authors (*Gastroenterology*, May, 1951) conclude that the antibiotic has a beneficial action worth further trial.

AN INVESTIGATION OF THE SALT AND WATER BALANCE IN MIGRAINE

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The physiological changes which are believed to occur in migraine were first summarized by Kinnier Wilson (1940) as follows: (1) A vascular disturbance. (2) Exudative changes, i.e., oedema either due to (*a*) arterial spasm followed by anoxaemia and increased capillary permeability in localized areas of the brain, or (*b*) of an angioneurotic type set up by an allergic stimulus. (3) A disturbance of the neurosympathetic system. (4) The action of endocrine factors such as pituitary hormones.

In a more recent review of the migraine syndrome Wolff (1948) has shown how the evidence points to a primary constriction of the cerebral vessels, which gives rise to the prodromal signs of scotomata, vertigo, paraesthesia, and mobility defects; followed by vasodilatation during the period of headache. He quotes an interesting case described by Goltman (1935–6) of a young woman who had a left frontal bone defect following a decompression and who suffered from migraine. Before the onset of headache there was a blanching of the face followed by depression of the tissues within the area of the defect. As the headache developed the cerebral tissues were observed to expand so much as to cause a non-pulsatile swelling through the aperture in the skull. The patient then vomited and the swelling slowly subsided. These changes were visible evidence of an alteration in intracranial volume from one phase of the migraine attack to the next.

As there are no records in the literature of any changes in the cerebrospinal fluid pressure which might account for the cerebral swelling, it is reasonable to suppose that it is part of the generalized oedema which is known to occur before and during the early part of an attack of migraine. Amongst our own cases, which now number over 200, we have observed oedema of various parts of the body before an attack. Women patients often volunteer the information that their skirts become tight or their legs swell; while a number of subjects notice an increase in body weight. One made the remarkable complaint that her dentures fell out before an attack owing to the swelling of her gums.

It is well known clinically, too, that diuresis may occur in the terminal phase of an attack of migraine, but no explanation has been given of this, of the oedema, or of the subsequent restoration of a normal state of hydration.

Our interest in the salt and water balance in migraine arose from the trial by one of us (D.A.C.) of the effects of urea in the treatment of migraine as recommended by Brown (1943). In a series of 66 cases treated with sustained doses of 7½ g. of urea twice daily over a period of at least two months, a definite alleviation of symptoms was reported in 51 cases, which was a very much better result than that obtained by other recognized forms of medication. In contrast with the effect of such drugs as ergotamine tartrate, which are commonly employed for the immediate relief of an attack by virtue of their action on smooth muscle, it was found that a perseverance of treatment with urea over a long enough period lessened both the frequency and the severity of the attacks in 45 subjects, and procured complete relief in six of this group of patients.

Since the main action of urea is that of a diuretic, these clinical findings seem to indicate that diuresis, whether of natural occurrence or induced by urea, is a physiological means of restoring the body fluids to their normal balance.

Experimental Procedure

Our investigations into the salt and water metabolism of migrainous subjects were divided into two groups: (1) a study of the effects of a water imbibition test; and (2) an analysis of selected constituents in the blood and in the urine of migrainous subjects during the migraine cycle.

Water Imbibition Test.—This test was chosen as a means of showing the effects of the simplest form of diuretic, and a comparison was made of the behaviour of 8 normal and 26 migrainous subjects after the imbibition of a known amount of water. The migrainous subjects were not suffering from an attack of migraine at the time of these tests. Each individual was admitted overnight and was kept resting. Specimens of urine were kept from 8 p.m. The urine passed for four hours before the imbibition test was used for comparison with that passed for four hours subsequently. On the morning following admission a light breakfast of toast and butter and 6 oz. (170 ml.) of water was given at 7 a.m. Tea and other strong diuretics were forbidden. At 9.30 a.m. 1,500 ml. of water was given and taken in 10

TABLE I.—*Diuresis in Normal Subjects after Imbibition of 1,500 ml. of Water*

Subject No.	Sex	Vol. Urine (ml.)		Chloride (mg.)		Sodium (mg.)	
		Before	After	Before	After	Before	After
1 ..	F.	162	1,729	788	842	561	500
2 ..	M.	115	983	531	723	398	253
3 ..	M.	236	1,548	1,033	1,112	1,098	394
4 ..	M.	165	1,496	996	1,231	704	538
5 ..	F.	119	1,491	460	732	382	312
6 ..	F.	284	1,471	1,107	841	804	444
7 ..	M.	188	1,641	946	872	537	375
Average		181	1,480	839	908	641	431

TABLE II.—*Diuresis in Migrainous Subjects (Group I) after Imbibition of 1,500 ml. of Water*

Subject	Sex	Vol. Urine (ml.)		Chloride (mg.)		Sodium (mg.)	
		Before	After	Before	After	Before	After
1 ..	M.	313	1,772	1,848	1,774	970	995
2 ..	M.	244	1,696	1,090	1,832	647	954
3 ..	F.	205	1,744	437	1,217	311	814
4* ..	F.	197	1,624	1,470	1,951	932	1,296
5 ..	F.	221	1,902	1,174	1,940	720	1,250
6 ..	F.	161	1,739	530	1,450	367	890
7 ..	M.	145	1,770	880	1,576	480	893
8 ..	F.	300	1,592	590	995	310	416
9 ..	M.	155	1,818	673	1,334	541	1,026
10 ..	F.	157	1,839	1,005	1,861	938	1,372
11 ..	M.	156	1,527	632	1,751	823	853
12 ..	M.	137	1,828	786	2,311	527	1,098
13 ..	F.	108	1,351	632	1,216	514	739
14 ..	M.	245	1,886	1,084	2,128	881	1,468
15 ..	M.	113	1,362	700	1,505	690	1,173
16 ..	F.	126	1,338	914	803	523	622
Average		186	1,680	902	1,602	636	966

* Suffered from premenstrual migraine attacks.

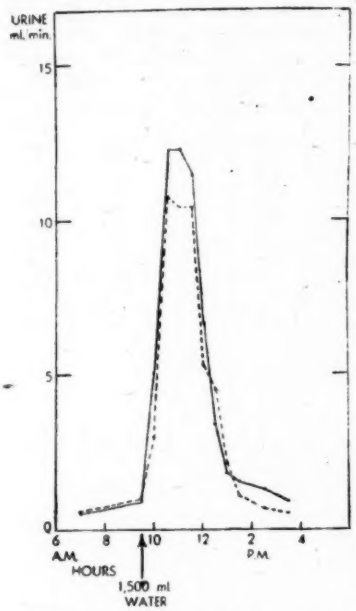

FIG. 1.—Rate of urine excretion after 1,500 ml. of water by mouth given at 9.30 a.m. ——= Average excretion for 16 cases of migraine. - - - -=Average excretion for seven normal control subjects.

minutes. The urine was collected at frequent intervals during diuresis and each sample was analysed separately.

A marked diuresis occurred in both normal and migrainous subjects, but none of them developed a headache. Ten of the migrainous subjects were unable to drink the total amount of water, and were therefore considered separately (group II). The 16 who were able to drink the 1,500 ml. of water are classified as group I.

Estimations. — The volume, specific gravity and reaction were recorded for each sample of urine. Sodium estimations were performed by the method of Kramer and Gittleman (1924) (Eisenman's modification: Wakeman, Eisenman, and Peters, 1927), and chloride by the modified Volhard–Harvey titration method (Volhard, 1878; Harvey, 1910).

Results

Diuresis.—(*a*) The average total volume of urine excreted in the resting period (four hours before the test) is the same for the migrainous as for the normal subject (Tables I and II). (*b*) In the period of diuresis (four hours after the inbibition of water) the total volume of urine excreted by the migrainous subject is slightly greater than that excreted by the normal. (*c*) The rate (Fig. 1) and range (Fig. 2) of excretion are alike.

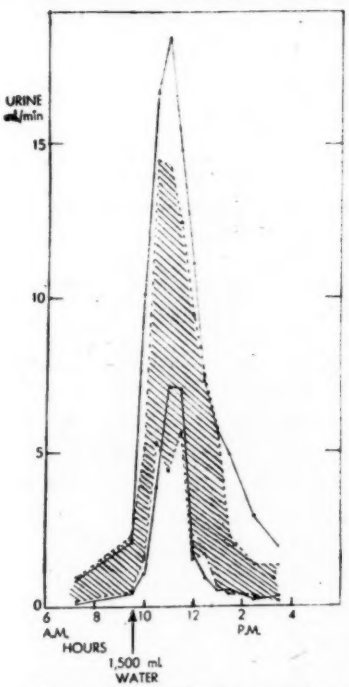

FIG. 2.—Range of urine excretion after 1,500 ml. of water by mouth given at 9.30 a.m. Area between continuous lines shows range of excretion for 16 cases of migraine. Shaded area shows range of excretion for seven normal control subjects.

Total Chloride Excretion.—(*a*) In the resting period the chloride excretion of the migrainous subject was higher than that of the normal. (*b*) In the period of diuresis the chloride excretion was raised slightly in the normal subject, and was almost doubled in the migrainous subject (Tables I and II and Fig. 3). (*c*) The range of chloride excretion was alike before the test, but dissimilar for four hours afterwards (Fig. 4).

Total Sodium Excretion.—(*a*) In the resting period the average sodium excretion was the same for normal and for migrainous subjects. (*b*) In the period of diuresis the sodium excretion was reduced in the normal and markedly increased in the migrainous subject (Tables I and II and Fig. 5). (c) The range for sodium excretion was alike before the test, but quite dissimilar for four hours afterwards (Fig. 6).

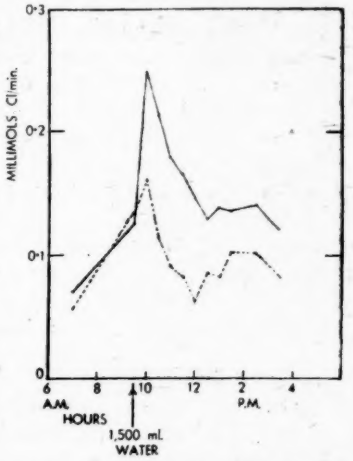

FIG. 3.—Rate of chloride excretion after 1,500 ml. of water by mouth given at 9.30 a.m. ——=Average excretion for 16 cases of migraine. - - - -=Average excretion for seven normal control subjects.

These findings were repeated in the 10 migrainous subjects (group II) who were unable to consume the total 1,500 ml. of water (Table III). These subjects had a lower output of urine and of sodium and of chloride in the resting period than those in group I, but the proportional increase in output in diuresis was approximately the same (Table IV).

An analysis of the results in terms of milliequivalents per litre (Table V) shows, as one would expect, that the concentration of sodium and chloride is much reduced in diuresis. It also shows that in diuresis the migrainous subject excretes equivalent amounts of sodium and chloride, but that the reabsorption of sodium and chloride falls considerably below that of the normal subject.

We did not induce an attack of migraine in any of our subjects as did Redisch and Pelzer (1943), who stated that 21 out of 29 subjects suffered from an attack of migraine after the ingestion of 1,500 ml. of water followed by a dry meal after a period of four hours.

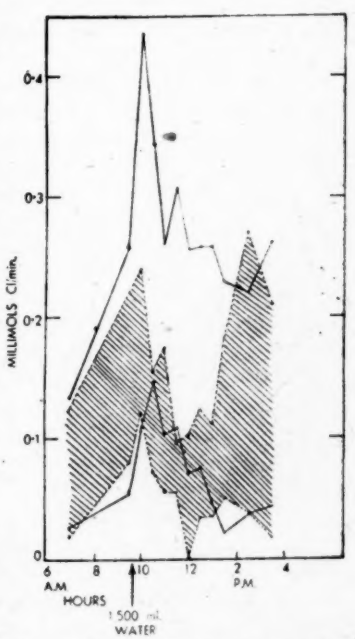

FIG. 4.—Range of chloride excretion after 1,500 ml. of water by mouth given at 9.30 a.m. Area between continuous lines shows range of excretion for 16 cases of migraine. Shaded area shows range of excretion for seven normal control subjects.

Variations in Certain Constituents of Blood and of Urine during the Migraine Cycle

During the past three years it has become increasingly apparent to us that the migrainous subject is invariably in

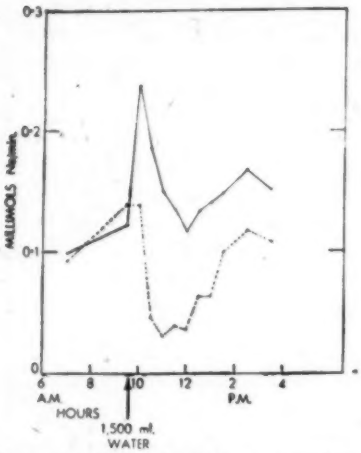

FIG. 5.—Rate of sodium excretion after 1,500 ml. of water by mouth given at 9.30 a.m. ——=Average excretion for 16 cases of migraine. - - - -=Average excretion for seven normal control subjects

a tense, excitable, or overanxious state before and during an attack, and that during the period of recovery he develops a general flaccidity or exhaustion and a predisposition to sleep, and often exhibits diuresis.

In our series of over 200 cases, two-thirds were women, many of whom suffered from premenstrual migraine and from generalized oedema in the premonitory phase.

We selected certain constituents of the blood and of the urine for analysis, in the hope that the variations which occur during the cycle of an attack might reveal further evidence of the nature of the biochemical disturbance in migrainous subjects.

(*a*) *Level of Blood Sodium.*—The normal range of blood sodium is generally accepted as being 320–350 mg. per 100 ml. We found that several of our subjects whom we submitted to the water imbibition test had a blood sodium level of 340 mg. or above, particularly when they were on the brink of an attack. Further analysis (Table VI) showed that the blood sodium level is high in the prodromal phase of an attack, that it often rises above the upper limits of normal during an attack, and that it returns to normal in recovery and in the interim phase between attacks. We have repeated these observations on numerous occasions and find that the high level of blood sodium is associated with migrainous headache, whether or not the latter is accompanied by vomiting.

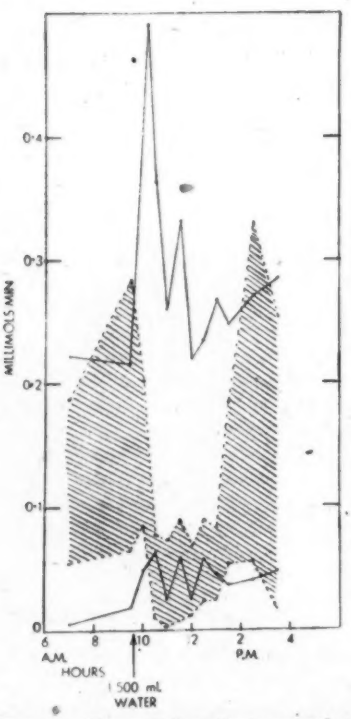

FIG. 6.—Range of sodium excretion after 1,500 ml. of water by mouth given at 9.30 a.m. Area between continuous lines shows range of excretion for 16 cases of migraine. Shaded area shows range of excretion for seven control subjects.

(*b*) *Estimation of Plasma Proteins.*—In order to estimate the state of hydration of the blood during the migraine cycle, records were made of the albumin and globulin contents of the blood. There is no significant variation as between these proteins, but the total proteins (Table VII) are below the normal value of 6.28 g.% (King, Haslewood, and Delory, 1937)

TABLE III.—*Diuresis in 10 Female Migrainous Subjects (Group II) after Imbibition of 1,000–1,400 ml. of Water*

Quantity of Water (ml.)	Subject No.	Vol. Urine		Chloride		Sodium	
		Before	After	Before	After	Before	After
1,000	1	271	1,497	1,388	2,021	1,069	1,283
	2*	60	849	376	885	263	486
	3*	95	1,272	364	837	226	429
	4*	173	1,270	487	975	277	790
	5*	82	902	405	640	322	444
1,100	6*	175	1,020	733	935	633	766
1,200	7†	208	1,590	872	975	709	824
	8*	46	1,361	156	733	117	415
1,250	9*	313	1,315	1,133	1,395	596	886
1,400	10	117	1,351	645	1,297	512	974
Average 1,115		153	1,243	656	1,069	472	730

* Suffered from premenstrual migraine.
† Post-menopausal migraine.

TABLE IV.—*Average Proportional Increase in Diuresis in Comparison with Resting Period*

	Vol. Urine	Sodium	Chloride
Normal	8·2 times	0·67	1·1
Migrainous Group I	9·0 times	1·52	1·78
Migrainous Group II	8·1 times	1·5	1·63

TABLE V.—*Comparison of Sodium and Chloride Output in mEq/per Litre*

	No. of Subjects	Sodium		Chloride	
		Resting	Diuresis	Resting	Diuresis
Normal (after 1,500 ml.)	8	154	14·0	136	17·3
Migraine (after 1,500 ml.)	16	149	25·0	136	26·8
Migraine (after 1,000 ml.)	5	141	25·1	125	25·4

TABLE VI.—*Variation of Blood Sodium in Migraine (mg./100 ml.)*

Subject No.	Prodromal Phase	Migraine Attack	Recovery from Attack	Interim
1				338
2	343			
3	338		328	
4			326	
5		346	328	338
6				333
7	363			
8		353		
9	356			
10	362			
11	346			
12				346
13		364		344
	338	363		
14		363		
		363		
		362		
15	351			331
16	341			
17		370		
		354		
18		353		
19		346		
		346		
20		353		
	352	357	336	332
	348	361	338	344
21			342	343
				348
22				338
23		356		
24				334
25		348		
26				332
27		352		
28			327	
29				336
30		365		
		373		
		373		
31		368		
		368		
		368		
		370		
Average	349	359	333	339

In subjects 14, 18, 20, 21, and 31 the successive figures during an attack, and in recovery, were obtained at intervals of 24 hours, on successive days.

TABLE VII.—*Variation in Total Plasma Proteins in Migraine (g.%)*

Subject No.	Prodromal Phase	Migraine Attack	Recovery from Attack	Interim
1				6·48
2	5·04			
3	5·67			
4			6·11	
5		6·57	6·41	
6				6·08
7	5·7			
8		5·86		
9	6·15			
10	6·11			
11	6·78			
12				6·41
13		5·79		5·65
14	5·86	5·37		
		5·22		
		5·79		
15	5·27			5·87
16	5·83			
17		6·61		
		6·05		
18		5·27		
19		5·64		
		5·44		
20		6·16		
	5·24	5·06	4·73	
21	5·10	5·85	5·84	5·70
			5·81	6·21
				6·91
22				6·95
23		5·76		
24				6·91
25		6·52		
26				7·25
27		5·85		
28			6·11	
29				6·82
30		5·80		
31		5·86		
		5·34		
		5·33		
		5·27		
		5·38		
Average	5·70	5·71	5·83	6·44

In Subjects 14, 17, 19, 20, 21, and 31 the successive figures during an attack, and in recovery, were obtained at intervals of 24 hours, on successive days.

both before and during an attack, and they rise again to normal value in the interim. A calculation of the colloid osmotic pressure by Govaerts's (1925) original formula (5.5 × albumin g.% + 1.4 × globulin g.%) demonstrates the same phenomenon—namely, the average values are low, being 22.7, 23.6, and 22.8, respectively before, during, and after an attack, and return to a normal level of 26.0 in the interim (normal range, 25–30 cm.Hg). It would appear then that the blood is overhydrated throughout an attack of migraine, and that if the appropriate correction were made for this the level of blood sodium would be still higher.

(*c*) *Level of Blood Potassium.*—The values for potassium during the migraine cycle were within the normal ranges of 16–20 mg. per 100 ml., but they tended to be low when the sodium values were high (Fig. 7).

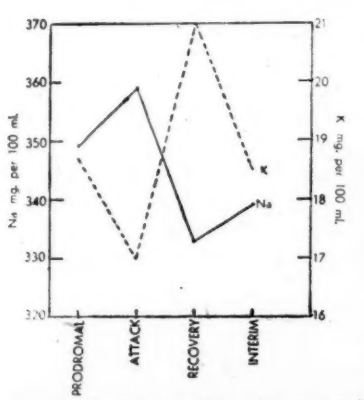

FIG. 7.—Inverse variation in sodium and potassium levels in the serum during the migraine cycle (average of 31 cases).

Discussion

The observations which we have been able to make have shown that most of these people are both physically and mentally overactive. They are liable to tension before an attack, and afterwards complain of feelings of muscular weakness and fatigue, which often culminate in deep sleep. When they awaken they feel fit and well. The weakness and fatigue contrast markedly with the pre-migraine "motor" tension, and it is during the change from one state to the other that there is an accompanying alteration in certain constituents of the blood.

In a series of cases analysed for symptoms by one of us (K. M. H.) two-thirds were women, many of whom suffered from premenstrual migraine. This is of interest because the sex hormones can produce salt and water retention. Thorn *et al.* (1938) found that, in dogs, sodium chloride and water are retained in significant amounts following the injection of oestradiol. They also found that in 50 women between 23 and 26 years of age 24 gained 1 kg. or more in the premenstrual phase, while two lost weight. The increase in weight was accompanied by swelling of the abdomen. With the onset of menstruation there was an increase of salt excretion and a reduction of body weight. Singh, Singh, and Singh (1947) have precipitated migraine in susceptible subjects by the injection of oestrin, and relieved them with progesterone.

Apart from the more frequent occurrence of migraine in women, and the more severe symptoms on the whole in women as compared with men, there is no essential difference between the sexes in the biochemical findings which we have to report.

Our results show that after the imbibition test with 1,500 ml. of water there are striking differences in the excretion of chloride and of sodium by the migrainous subject as compared with the normal subject, but that in their total excretion of water there is no such difference. In both classes of subject the maximum rate of output of chloride occurred immediately before the peak of diuresis, and diuresis ceased five hours after the test. The normal subjects resumed their resting rate of chloride excretion within two and a half hours of the test, but the migrainous subjects showed a rate of excretion which was still above normal seven hours after the test. The total amount of chloride excreted by migrainous subjects during the four-hour test period was about double that excreted by normal subjects, although in the four-hour test period preceding the test the excretion of chloride was much the same as in the normal. Our normal subjects showed a transitory increase and then a decided fall in chloride excretion during diuresis, the variation being the same as that recorded by Marshall (1920), Priestley (1921), and Eggleton (1943), if allowance is made for the different methods employed for testing.

We found an even more striking difference in the sodium excretion. Whereas in the resting period before the test the excretion of sodium was almost precisely the same in the two classes of subjects, during diuresis the normal subjects showed a decrease of approximately one-third in comparison with the resting output, while the migrainous subjects increased their output by one-half.

Relation of Blood Sodium Level to Sodium Excretion

Many of our migrainous subjects showed a relatively high level of blood sodium at the time of the imbibition test, but still exhibited a normal water diuresis. In fact, neither the initial level of the blood sodium nor the extent of its fall during a known period bore any close relation to the amount of sodium excreted or to the total diuresis during the same period. Crutchfield and Wood

(1948) obtained a normal diuresis after giving 1,000 ml. to patients with congestive heart failure, many of whom had a low blood sodium. They concluded that the "retention of the sodium ion is of nearer primary importance than the retention of water." McCance and Widdowson (1937–8), on the other hand, were unable to produce a water diuresis in Addison's disease. These observations, together with our findings that normal water diuresis can occur in the presence of a high blood sodium, support the view that the level of the blood sodium is not the only factor in the production of diuresis. More recently Verney (1946) has shown that water excretion is controlled by the antidiuretic hormone which is produced by the posterior lobe of the pituitary body. He states that the diuresis which follows water imbibition is due to the rapid dilution of the blood, which inhibits the activity of the hormone. This hormone is the primary factor in maintaining the fluid volume of the body at an almost constant percentage of the body weight.

Newburgh and Leaf (1950) point out that the fixity of concentration of sodium and chlorides in the extracellular fluids is a function of adrenocortical hormones working in conjunction with the antidiuretic hormone on the kidneys. "These hormones working together cause a reabsorption of a fluid in which the concentration of sodium is very nearly identical with its concentration in the extracellular fluid, and also the reabsorption of the amount of this fluid which is required to maintain the normal quantity of body fluid." The action of the kidneys in conserving sodium is one which favours the shift of water from intracellular to extracellular compartments of the body and the maintenance of extracellular hydration.

The observations recorded in the second part of our experimental work provide evidence that the state of hydration of the blood and the level of blood sodium are disturbed during the various phases of the migraine cycle. Not only did a number of patients develop oedema as a physical sign of an impending attack of migraine, but they gave evidence of increased hydration of the blood by a fall of total proteins of the blood before, during, and after an attack. The average for each phase was 5.70, 5.71, and 5.83 g.%, respectively. In the interim phase, between the attacks, the average value of 6.44 g. was still in the lower range of normal.

The average blood sodium levels were 349 mg. per 100 ml. in the prodromal phase, rising to 359 mg. during the early stages of an attack and returning to a normal figure of 333 mg. during recovery. In the interim phase it rose to 339 mg. In some cases we have observed a large diuresis accompanied by a large output of sodium at the termination of a sharp attack of migraine. In the recovery the blood sodium appeared to return to a normal level before the plasma proteins did so. The exact balance of these changes during an attack of migraine is the subject of further investigations.

It may be noted here that Duncan (1947) gives five conditions in which the blood sodium and chloride are raised. (*a*) Excessive administration of salt in cases of urinary suppression or oliguria; (*b*) the nephrotic stage of glomerulonephritis; (*c*) Cushing's syndrome; (*d*) congestive heart failure; and (*e*) excessive sweating with simultaneous restriction of fluid intake.

We have already mentioned that retention of sodium and chloride may also occur in women during the premenstrual phase.

The findings made in the first group of experiments might be explained theoretically in terms of the work demanded of the kidneys under conditions of water diuresis.

If the level of sodium in the blood is raised as a result of adrenocortical overactivity the cells of the renal tubules would have a greater amount of work to do in returning the sodium from the glomerular filtrate to the body fluids than if the blood sodium were at a lower level. This work would be further increased if the colloid osmotic pressure of the blood were low. Newburgh and Leaf (1950) have pointed out that renal work increases as the daily urinary volume rises (at levels above 2 litres a day), and that it is further increased if the urinary sodium chloride concentration is low.

If all these factors be borne in mind it is evident that during the pre-migraine state of a high blood sodium and a low colloid osmotic pressure the kidneys have an abnormally heavy task imposed upon them in conditions of water diuresis as compared with normal control subjects, and that as a result there is an escape of sodium The greatest loss occurs early in the diuresis at the time of the maximum rate of urinary excretion.

In view of the great mental and physical activity of migrainous patients it is reasonable to suggest that they suffer from overactivity of the adrenal glands, including an oversecretion of adrenaline and adrenocortical hormones. The latter would account for the predisposition to maintain a high blood sodium before an attack of migraine, which is so often brought on by stress. Verney (1946) has shown in some experimental work on dogs that the production of the antidiuretic hormone is stimulated both by emotional stress and by a rise in the sodium chloride concentration in the arterial blood. In the migraine syndrome there is an analogous state, in which both factors, acting together, may give rise to water retention. The attack of migraine so caused is a physiological crisis which usually terminates by water diuresis and the excretion of the surplus sodium, at the moment when the secretion of the antidiuretic hormone fails. If this is the true course of events, the beneficial effect of urea may be understood to be due to the continuous mild diuresis which prevents the accumulation of sodium and of water in the blood.

In women, the particular influence of the sex hormones during the premenstrual phase may exacerbate the rise in blood sodium and chloride, so that an attack will almost inevitably occur at this time.

Conclusion

Migraine is a disease which is accompanied by a disturbance in salt and water metabolism. In the pre-migraine phase, and more particularly in the early stages of the attack itself, the blood sodium rises to a high level, while at the same time there is marked hydration of the blood. The excessive secretion of sodium and chloride which follows a water imbibition test suggests that an abnormal sodium metabolism is present almost continuously.

The suggestion is made that these disturbances are due to the disordered functions of the hormones governing salt and water metabolism of the adrenal cortex and posterior pituitary gland, and that in women they are exacerbated by the influence of certain sex hormones.

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DEAFNESS AS AN EPIDEMIC DISEASE IN AUSTRALIA

A NOTE ON CENSUS AND INSTITUTIONAL DATA

BY

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It has generally been assumed that the epidemics of deafness and other congenital defects associated with births in the years 1938–41 and reported by Gregg (1941), Swan *et al.* (1943), Patrick (1948), and others from the various Australian states were a new and unusual manifestation of rubella. So far as we are aware there has been no report of an extensive epidemic, prior to these years, giving rise to cases of deafness. It is proposed to put on record here certain observations suggesting that similar epidemics have occurred in the past, notably a very extensive epidemic of births of the deaf in 1899 in the states of Australia. We have definite knowledge of a great epidemic of rubella throughout Australasia in the previous year. It is reasonable to presume provisionally that many of the cases of deafness were due to that disease, although it is not possible to relate individual cases of deafness to a history of maternal rubella.

Epidemic Nature of some Forms of Deafness

In the three successive Australian censuses of 1911, 1921, and 1933 the statistician's report on the census gave a chapter to the answers on the questions regarding blindness and deaf-mutism in the census. It was apparent that the prevalence of blindness rose with increasing age in the population. On the other hand, the prevalence of deaf-mutism showed a maximum in each census corresponding in each case to persons born in the years 1896–1900. The fact that 12 years elapsed between two of the censuses makes it possible to deduce that the excess of births of these deaf may have occurred in the years 1898–1900. The occurrence of a modal age for the prevalence of deafness was most evident in New South Wales. The numbers of deaf-mutes enumerated at the three censuses in New South Wales are given by age and sex in Table I. The numbers

TABLE I.—*The Deaf-mutes in New South Wales as Enumerated at the Three Censuses*

Age Group	1911 Census		1921 Census		1933 Census	
	Males	Females	Males	Females	Males	Females
0–	8	8	7	10	7	4
5–	34	25	39	33	57	38
10–	(54)	(57)	43	43	56	33
15–	35	29	30	27	68	73
20–	36	29	(69)	(46)	49	49
25–	34	26	36	23	44	25
30–	24	30	35	32	(78)	(62)
35–	35	22	35	27	44	27
40–	14	22	22	25	31	28
45–	19	13	25	25	28	24
50–	13	15	9	17	29	18
55–	8	6	13	11	18	22
60–	11	7	12	14	15	14
65+	4	16	21	29	14	25
Unclassified ..	1	5	0	3	1	1
Total ..	330	310	396	365	539	443

in the modal age groups are given in parentheses. In 1911 the maximum prevalence of deaf-mutism occurred in the age group 10–14 years, and the statistician, G. H. Knibbs (1917), was inclined to ascribe the maximum to the more complete enumeration of the deaf at the school ages. In 1921, however, it was clear that this explanation was inadequate, for the maximum was to be found at the age group 20–24 years, and this maximum was due to the same "cohort" or group of persons, who had merely aged in between the censuses. The statistician, C. H. Wickens (1927), considered the possibilities of epidemic disease as a cause of the deafness in the following words: "The age incidence of the deaf-mutism varies in such a manner that it is apparent that the cause of the disability is of variable intensity, and there is some evidence to suggest that the increase in incidence of deaf-mutism at certain ages synchronizes with the occurrence of epidemic diseases, such as scarlet fever, diphtheria, measles, and whooping-cough." At the report on the census of 1933 the statistician, Roland Wilson (1942), again discussed infective disease as the cause of the deafness. We have followed the lead given by these census reports and have determined the date of birth of the deaf admitted to certain of the institutions throughout Australia. Here only the data from the New South Wales Institution for the Deaf and Dumb and the Blind will be discussed in detail, but similar considerations will apply to the data from the other states, which are also presented in the tables.

Births of the Deaf in New South Wales

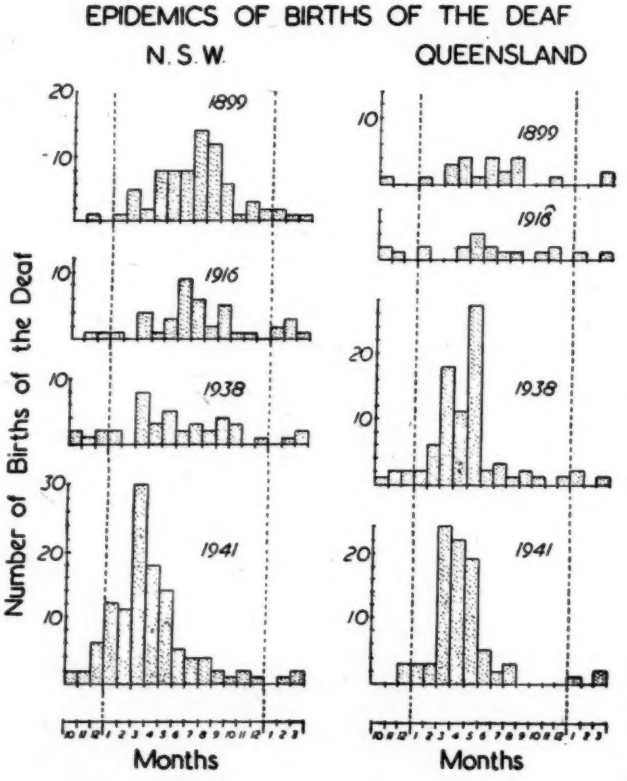
Since the opening in 1861 of the New South Wales Institution for the Deaf and Dumb and the Blind there has been a well-kept register of the admissions. For the earlier admissions the month of birth was not always noted. We have been able to distinguish the sex, wherever it has not been explicitly stated, by means of the Christian name of the patient. In Table II the numbers of those born deaf admitted to institutions are given for New South Wales and other states. Since in the earlier years the admissions were few in number and did not seem to suggest epidemic occurrences, the results have been pooled up to the year 1880. From this year onwards the numbers of births of the deaf,

TABLE II.—*Numbers Born Deaf Admitted to Certain Institutions in the States (or Colonies) of Australia, by Years*

Year	Number of Deaf Births in the State of					Year	Number of Deaf Births in the State of				
	N.S.W.	V.	Q.	S.A.	W.A.		N.S.W.	V.	Q.	S.A.	W.A.
-1879	239		1	64	19	1916	(32)	8	(15)	7	4
1880	5		2	4	1	7	19	9	11	11	2
1	16		—	4	—	8	13	12	8	4	4
2	13		—	3	—	9	11	9	9	4	3
3	10		2	4	—	1920	19	9	11	5	3
4	8		2	4	2	1	14	10	14	8	6
5	12		7	6	2	2	17	10	10	10	2
6	11		1	7	1	3	18	11	8	8	4
7	17		4	4	4	4	(27)	(20)	10	10	2
8	12		3	4	3	5	(29)	7	13	5	5
9	14		2	7	1	6	14	7	6	5	2
1890	8	6	—	4	4	7	11	10	10	6	5
1	8	12	3	8	3	8	12	10	7	4	4
2	10	6	3	5	3	9	15	7	9	3	6
3	12	7	4	4	2	1930	23	5	14	6	4
4	10	7	2	3	2	1	17	5	7	7	2
5	11	4	3	7	1	2	11	6	4	2	2
6	16	4	1	7	3	3	10	7	4	2	4
7	12	5	12	4	5	4	19	3	6	1	3
8	15	12	4	(10)	(8)	5	15	5	10	6	1
9	(70)	14	(20)	(22)	(9)	6	19	6	6	3	5
1900	16	11	6	9	2	7	21	5	11	7	6
1	7	6	4	6	2	8	(33)	(17)	(74)	4	4
2	8	13	8	3	5	9	14	(33)	8	2	4
3	13	9	4	5	2	1940	(28)	(39)	7	(17)	(18)
4	14	7	8	7	2	1	(104)	(64)	(81)	(17)	(13)
5	8	11	4	4	2	2	9	14	11	7	1
6	11	4	10	3	3	3	(23)	(20)	(25)	11	
7	13	6	3	7	5	4	10	7	11	3	
8	13	7	8	11	5	5	9	4	7	6	
9	12	12	6	7	2	6	2	2		4	
1910	15	14	8	11	4						
1	16	13	12	9	4						
2	13	9	5	6	3						
3	16	7	6	4	5						
4	21	11	5	7	1						
5	16	15	10	2	1						

later admitted to the Institution, are given for each individual calendar year. As usually the children are not admitted to the institutions until they reach school age, the entries from the year 1942 onwards are much more incomplete as a record of deaf persons than the figures for earlier years. A further cause of incompleteness is the recent opening of special schools for the deaf, other than the Institution. Perhaps, too, there has been a change in the outlook of the parents over the years, so that more of them now send their children and have them admitted at an earlier age than formerly. In any case, these differences will not trouble us, as we shall be interested only in comparing the number of births of the deaf in the Institution in a single year with the numbers in the two neighbouring years with a view to deciding whether the central year is to be regarded as an epidemic year for births of the deaf. The term "epidemic" is in no way confined to an infective cause, as other, non-infective, causes may also be epidemic—for example, the avitaminoses. It is immediately apparent that the years 1899, 1938, 1941, and perhaps 1916, 1924, and 1925, are to be regarded as epidemic years for the births of the deaf in New South Wales. 1940 itself did not contain a number of such births greatly increased above expectation, but when the monthly incidence is examined it is evident that the epidemic of births of the deaf in 1941 began in December, 1940, and continued throughout the first eight months of 1941.

Analysing the figures for New South Wales in more detail, we find that there were 70 births of the deaf in 1899 but only 15 in 1898 and 16 in 1900. This great excess of births of the deaf in 1899 as compared with the numbers in the previous and following years can be explained only by presuming an epidemic cause acting from without. Thus we should regard such a finding as very unlikely on the hypothesis that the cause was genetic and hence that each of the events—the births of the deaf—was independent. In Table III and the Graph the monthly incidence of the births of the deaf is given. The births in the epidemic years are not distributed evenly throughout the year, but tend to be grouped around the month of June. Thus we find that the monthly incidence in 1899 for New South Wales is 1 case in January, 5 in February, 2 in March, followed by 8 in each of the months of the second quarter, 14 in July, 12 in August, and 6 in September. We may regard this month as the end of the epidemic, for there were but 1, 3, and 2 births in the last three months of the year. Of course, the case for an epidemic cause is strengthened by the fact that in 1899 there were also excessive numbers of births of the deaf in other Austra-



lian colonies. Notable epidemics occurred in Western Australia and Queensland, but the numbers were not convincingly raised in Victoria. It seems that we must regard 1898, too, as an epidemic year in Western Australia and in South Australia. If so, it is tempting to trace the beginning of the epidemic to the port nearest to Europe and to suggest that rubella may have died out completely in Australia before that year. The number of births in New South Wales for 1916 was not so strikingly above that for the neighbouring years, but within the year there was a concentration of the births in the months of June, when there were nine births, and of July, when there were six births. Support for the view that 1916 was an epidemic year comes from Queensland. Again, in 1924 there were 27 births of the deaf in New South Wales, four being in March and six in April. There was also an excess of births of the deaf in 1924 in Victoria. In New South Wales an excessive number of births (29) were recorded in 1925, of which four occurred in July and six in August.

There is more definite ground when we deal with the most recent years. 1938 was definitely an epidemic

TABLE III.—*Date of Birth of the Deaf in Australia in Certain "Epidemic Years"*

State	Year	Number of Births Recorded of the Deaf in the Month of												Male	Female	Total
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.			
S.A.	1898	—	—	1	—	2	—	1	—	—	1	2	3	8	2	10
W.A. ..	1898	—	—	—	—	1	—	4	—	—	—	2	1	5	3	8
N.S.W. ..	1899	1	5	2	8	8	8	14	12	6	1	3	2	49	21	70
Vic.	1899	3	2	1	1	3	1	1	—	—	—	1	1	9	5	14
Q.	1899	1	—	3	4	1	4	2	4	—	—	1	—	13	7	20
S.A.	1899	1	4	1	3	1	3	2	2	2	3	—	—	8	14	22
W.A. ..	1899	3	1	2	2	—	—	—	1	—	—	—	—	3	6	9
N.S.W. ..	1916	1	—	4	1	3	9	6	2	4	1	1	—	17	15	32
Vic.	1916	1	1	—	1	2	1	—	1	—	1	—	—	3	5	8
Q.	1916	2	—	—	2	4	2	1	1	—	1	2	—	7	8	15
S.A.	1916	—	—	1	—	1	—	1	2	2	—	—	—	3	4	7
W.A. ..	1916	1	—	—	—	—	—	—	—	—	—	—	1	2	—	2
N.S.W. ..	1938	2	—	8	3	5	2	3	2	4	3	—	1	18	15	33
Vic.	1938	—	1	—	4	4	1	1	1	1	—	3	1	10	7	17
Q.	1938	2	6	18	11	27	2	3	1	2	1	—	1	40	34	74
S.A.	1938	—	—	—	1	—	—	1	—	1	1	—	—	2	2	4
W.A. ..	1938	—	—	—	1	—	—	1	—	—	—	1	1	3	1	4
N.S.W. ..	1940	1	1	1	5	2	2	—	3	3	2	2	6	17	11	28
Vic.	1940	3	2	3	4	7	2	5	1	7	1	3	1	21	18	39
Q.	1940	—	—	—	—	1	1	2	—	—	—	—	3	4	3	7
S.A.	1940	—	2	4	2	—	1	5	—	2	—	—	1	11	6	17
W.A. ..	1940	—	1	2	2	4	—	1	2	1	—	2	3	9	9	18
N.S.W. ..	1941	12	11	30	18	14	5	4	4	2	1	2	1	53	51	104
Vic.	1941	8	13	10	15	7	2	3	2	1	1	1	1	28	36	64
Q.	1941	3	3	24	22	19	5	2	3	—	—	—	—	38	43	81
S.A.	1941	1	2	2	5	—	1	—	3	1	1	1	—	7	10	17
W.A. ..	1941	4	2	1	2	1	—	2	1	—	—	—	—	8	5	13
Total ..		50	57	118	117	117	52	65	48	39	19	27	28	396	341	737

TABLE IV.—*Month of Birth of the Deaf in Australia as Recorded in Non-epidemic Years*

State	Years	Number of Births of the Deaf Recorded in the Month of													Sex		Total
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Uncl.*	M	F	
N.S.W. ..	1872 to 1898	28	22	28	28	25	21	32	34	32	21	16	20	15	195	127	322
Vic. ..	1890 „ 1898	4	5	3	11	6	5	8	2	2	7	5	5		31	32	63
Q. ..	1872 „ 1898	4	10	4	5	4	4	5	2	3	9	6	0		32	24	56
S.A. ..	1870 „ 1897	12	7	7	10	8	11	16	9	7	13	16	10	3	78	51	129
W.A. ..	1877 „ 1897	5	3	2	2	3	4	4	5	2	3	3	1	5	21	21	42
N.S.W. ..	1900 „ 1915	12	11	17	21	28	17	14	20	23	14	21	14		120	92	212
Vic. ..	1900 „ 1915	11	17	14	12	7	14	11	14	14	16	8	17		82	73	155
Q. ..	1900 „ 1915	16	10	9	13	7	8	10	7	9	11	6	0		61	45	106
S.A. ..	1900 „ 1915	6	14	8	10	5	11	6	6	9	11	8	7		52	49	101
W.A. ..	1900 „ 1915	4	6	6	2	2	6	1	3	2	9	5	1	1	24	24	48
N.S.W. ..	1917 „ 1937	23	32	33	31	29	25	34	32	34	31	32	23	1	193	167	360
Vic. ..	1917 „ 1937	20	10	14	11	14	15	17	15	14	18	12	13		98	75	173
Q. ..	1917 „ 1937	18	18	17	20	19	15	15	23	11	9	16	7		97	91	188
S.A. ..	1917 „ 1937	9	12	10	11	11	8	15	11	11	7	5	7		47	70	117
W.A. ..	1917 „ 1937	3	5	7	10	4	6	5	11	7	8	6	3		49	26	75
Summary:																	
Australia,	up to 1897–8	53	47	44	56	46	45	65	52	46	53	46	36	23	357	255	612
„	1900 to 1915	49	58	54	58	49	56	42	50	57	61	48	39	1	339	283	622
„	1917 to 1937	73	77	81	83	77	69	86	92	77	73	71	53	1	484	429	913
„	to 1937 ..	175	182	179	197	172	170	193	194	180	187	165	128	25	1,180	967	2,147

* Uncl. = Unclassified by month.

year in New South Wales, Victoria, and Queensland. The epidemic appears to have lingered on in Victoria, reaching a peak in 1941. In New South Wales, on the other hand, there is no evidence of an epidemic in 1939 or in 1940 until December, when the births were six, the epidemic then continuing to August, 1941. In Queensland, too, there were two epidemics separated by a period of about two years, in 1938 and in 1941, with no evidence of epidemic incidence intervening. In Western Australia the epidemic years were 1940 and 1941. In any year regarded as epidemic, or as possibly epidemic, the incidence of the births by months is of interest. We have used the fact of concentration in certain months of the year as corroborative evidence that the year was epidemic. We notice from the tables that, although the interepidemic births are, roughly, equally spaced throughout the year, the greatest incidence in the epidemic years falls in the early months of the year, with usually the greatest incidence in February to July. In the epidemic of which there is precise information, that of 1941, the peak incidence was in March, with 30 births, and April, with 18. These totals are not exhaustive for New South Wales. In 1899, however, the peak was in June, so that we should expect to find the activating cause acting in October, 1898. We shall see in a later section that in 1898, in Sydney, there were concurrent epidemics of measles (morbilli) and German measles (rubella). It seems easy in 1950 to suggest that the epidemics of the births and the rubella were causally related, with the reservation that some or all of the cases may have been due to measles, since this disease is thought sometimes to cause congenital defects (Packer, 1950).

The main points of the tables may be summarized as follows:

1. Among deaf children born in either epidemic or interepidemic periods there is a slight excess of male births. Thus in the epidemic years 396 males and 341 females were

born, and in the interepidemic years 1,180 males and 967 females. The proportion of male births is thus 0.537 for the epidemic years and 0.550 for the interepidemic years. This difference is small, and is not significant, as it corresponds to a χ^2 of 0.334 for one degree of freedom.

2. In epidemic years the births have a characteristic grouping about the month of April, but in the interepidemic periods they are scattered throughout the year.

3. If we compare the number of deaf persons born in New South Wales in 1897–1901 who later entered the Institution with the number of deaf-mutes enumerated at the 1911 census in the age-group 10 to 14 years, we find that the births outnumber the deaf-mutes. One perhaps would have expected more deaf-mutes to be enumerated than to have attended the Institution. The anomaly is to be explained partly by some of the children at the Institution not being considered mute if their hearing had been lost in childhood, and partly by the form of the question regarding deaf-mutism which was asked at the census. In 1911, for example, the census schedule directed: "Enter . . . as deaf and dumb only those who are dumb as well as deaf." Probably a number of those with congenital deafness would have learned to speak to some extent and so have passed out of the class to be enumerated. We suggest that the question (not asked in 1947), if reintroduced at future censuses, should be directed towards deafness rather than towards deaf-mutism.

4. Since the foundation of the New South Wales Institution, in 1861, about one-quarter of all cases admitted to it have been born in epidemic years. We may say that about 20% of the total admissions have been due to epidemic causes.

Some Epidemics of Rubella in Australia

The data on rubella incidence in Australia are fragmentary. Little interest has been displayed in a disease whose chief importance lies in its differential diagnosis from the other exanthemata of childhood. We have sought references to the occurrence of outbreaks of the disease in Australia. In the earliest Australian note on the disease, Thomas (1867) reported the occurrence of epidemics of scarlet fever, morbilli, and rubella in Melbourne. Jamison (1873) reported an epidemic of rubella at Warrnambool, Victoria, and commented on the high proportion of cases among adults. Ryan (1883) gave another clear account of the disease in Melbourne.

In New South Wales several papers of the greatest interest to us here were given by Scot Skirving (1898) and Spencer (1899). We may get an indirect idea of the magnitude of the epidemic in Sydney if we note that 389 deaths from measles occurred there in 1898, and that Spencer in his private practice had 231 cases of measles and 147 cases of rubella. Spencer noted that the cases of rubella occurred in the months May to October.

In Queensland, in the same year, Jackson (1898) reported an epidemic of rubella in Brisbane. In New Zealand we find Colquhoun (1898) reporting a big epidemic of rubella and noting the heavy incidence among the adult population. It is evident that, notwithstanding the slow communication between the colonies, there was a widespread outbreak of rubella in Australasia in 1898. The admissions to hospitals in later years would perhaps be useful in determining the incidence of the disease. At present this information is not in a condition to be included in this paper. Dr. W. J. Stevenson (personal communication) has found that 1923 and 1924, among others, were years of high rubella incidence in Melbourne.

Conclusions and Summary

Deafness has appeared in epidemic form in Australia in the past, notably among children born in 1899, 1916, 1924, 1925, and in 1938–41. There is some presumptive evidence that all these epidemics, with the exception of that in 1916, were caused by antecedent epidemics of rubella.

Until there are more detailed studies of the epidemiology of deaf-mutism in other countries, we cannot tell if the conditions which brought about the several epidemics of deaf-mutism in Australia are peculiar to it. It will be of interest to inquire whether in other more populous countries the disease virtually dies out in the interepidemic periods and a large reservoir of non-immunes are produced, with the occurrence of infection irregularly in childhood and adult life, giving rise to cases of maternal rubella.

ADDENDUM.—Since this paper was written Mr. N. E. Murray, director of the Commonwealth Acoustics Laboratory, Sydney, has informed me that he has audiograms of four persons born in New South Wales in the years 1924–5, each of the form likely to be encountered in patients deaf as a result of maternal rubella. The first of these patients, a female born on June 8, 1924, had a history strongly suggestive of maternal rubella and had been referred to Mr. Murray with the diagnosis already made. The second patient was a male born on July 4, 1925. His sister claimed that his mother had had rubella at the sixth month of pregnancy. The third and fourth patients, a male and a female, could not be traced for further questioning or the exact date of their birth, which had been stated to be approximately 1924. It is apparent that in the years 1924 and 1925, which I had regarded only tentatively as epidemic, there were persons born deaf as a result of maternal rubella.

I have to thank the Director-General of Health, Commonwealth of Australia, for permission to publish this paper; the superintendents of the institutions for the deaf, dumb, and the blind in the various states for abstracting or allowing me access to their records of admissions; and Professor L. Dods for encouragement and criticism in the preparation of this paper. Mr. W. D. Davies has drawn the graph.

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An article in the *New York Times*, December 3, has some interesting notes on various aspects of dentistry, culled from recent meetings of the American Academy of Dental Medicine and the New York Society of Dentistry for Children. One speaker emphasized the importance of psychiatric knowledge, because of a relation between diseases of the mouth and emotional disorders. Another felt that the good dentist should observe the patient as a whole and not merely his mouth, so that the proper time was chosen to refer him to a doctor. Dr. H. R. Klein, assistant professor of children's dentistry at New York University, said that premature extraction of the primary or milk teeth was responsible for at least 50% of adult tooth trouble. Parents often saw no harm in the extraction of teeth which would later fall out anyway, but in fact it led to malformation of the permanent teeth which followed. Every effort should be made to conserve teeth wherever possible.

GRAVES'S DISEASE: THE CLINICAL TYPES AND THEIR MANAGEMENT*

BY

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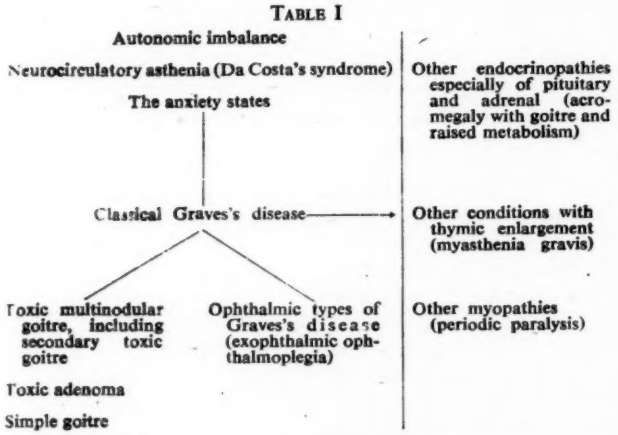
In thyrotoxicosis we consider one of the key problems of internal medicine. On one side classical Graves's disease overlaps the toxic nodular goitres (see Table I).

TABLE I


Autonomic imbalance
Neurocirculatory asthenia (Da Costa's syndrome)
The anxiety states
Classical Graves's disease
Toxic multinodular goitre, including secondary toxic goitre
Ophthalmic types of Graves's disease (exophthalmic ophthalmoplegia)
Toxic adenoma
Simple goitre
Other endocrinopathies especially of pituitary and adrenal (acromegaly with goitre and raised metabolism)
Other conditions with thymic enlargement (myasthenia gravis)
Other myopathies (periodic paralysis)

In both there is overproduction of thyroid hormone, but in other respects there are important differences. The precise aetiological relationship, for example, between secondary toxic goitre and classic Graves's disease is still not clear.

On another side Graves's disease merges into the anxiety states, autonomic imbalance, and neurocirculatory asthenia. On still another there are the gross and intriguing conditions of exophthalmos and ophthalmoplegia that still baffle our comprehension. Beyond are even more obscure linkages with other endocrinopathies, conditions with thymic enlargement, and myopathies.

Classification

Therefore a working classification of Graves's disease such as that given in Table II inevitably presents us

TABLE II.—*Classification of Thyrotoxicosis*

Group 1.—Classical Graves's disease, exophthalmic goitre, toxic diffuse goitre, primary toxic goitre.

Group 2.—Toxic nodular goitre:
- (*a*) toxic adenoma, hyperfunctioning single nodule (3% of thyrotoxics)
- (*b*) toxic multinodular goitre
  - sporadic
  - endemic
- (*c*) functioning (glandular) thyroid carcinoma with metastases

Group 3.—Ophthalmic types of Graves's disease including exophthalmic ophthalmoplegia { Spontaneous / Post-operative

Group 4.—Thyrotoxicosis factitia

with rather a hotchpotch. All the first group of terms are of course synonymous, and the clinical picture is too well known to require description.

Among the toxic nodular goitres, the toxic single nodule is almost certainly a true benign new growth, growing and functioning autonomously. In this case thyrotoxicosis is truly thyrogenic, and therefore it is fundamentally different, aetiologically, from classic Graves's disease, the origin of which is almost certainly extrathyroid.

The nodules in many toxic multinodular goitres, occurring sporadically, result from previous waves of thyrotoxic hyperplasia. These patients have a long history of low-grade or remittent thyrotoxicosis, and the nodules develop at foci of excessive hyperplasia in the gland substance. But in the endemic type the nodules are due to previous simple hyperplasia, thyrotoxicosis being only a late secondary development. In fact, radio-iodine studies have shown that in the endemic types the nodules are less actively secreting than the internodular tissue (Leblond *et al.*, 1946).

With regard to thyroid cancer, only a very small proportion of patients ever manifest thyrotoxicosis The hormone-forming ability of the malignant cells parallels their degree of cellular differentiation. Thus it is in the highly differentiated adenocarcinoma with follicles and colloid that thyrotoxicosis may occur. The cancer tissue is never as actively secreting as the normal follicles, but by virtue of its bulk, especially if there are metastases, a marked excess of hormone may be produced (Seidlin *et al.*, 1946 ; Fitzgerald and Foote, 1949).

The essential lesion in all the cases in Groups 1 and 2 is some degree of thyroid hyperplasia and hypersecretion. But in the ophthalmic types (Group 3) the emphasis is on the ocular changes. The patient may be hyperthyroid ; but she may also be euthyroid or even hypothyroid, as in the post-operative subgroup.

In thyrotoxicosis factitia the same systemic manifestations as in natural thyrotoxicosis result from excessive ingestion of thyroid extract. The patient may be overdoing a treatment for obesity or, more often, there is a psychopathic desire to escape into illness or even a suicidal intent.

It is remarkable that such extraneous overdosage with thyroid extract causes inactivity and actual atrophy of the patient's own gland. Thus in two such patients studied by Skanse and Riggs (1948), after a tracer dose of radio-iodine, virtually no radioactivity was demonstrable over the thyroid gland, and in 48 hours 97% of the tracer dose was excreted in the urine, showing that they had no functioning thyroid tissue whatever.

The Pituitary–Thyroid Axis

If we try to understand the thyrotoxic hotchpotch we soon come down to a diagrammatic concept of what has been termed the pituitary–thyroid axis (Fig. 1). There tends to be a physiological balance between thyroid-stimulating hormone (T.S.H.) from the anterior pituitary, and the resulting thyroid secretion (T.H.), which, getting into the blood, circulates back and tends to reduce T.S.H. Administer thyroid extract in excess as in thyrotoxicosis factitia and there is complete suppression of pituitary T.S.H. The patient's own thyroid then shrinks and atrophies.

This concept has a practical bearing on the treatment of toxic adenoma. Using radio-iodine we can compare the iodine uptake and secretory activity of the adenoma with those of the surrounding thyroid tissue. The radio-iodine, undergoing synthesis into hormone, will expose a photographic plate when a thin slice of gland is laid on it.

*A postgraduate lecture given at Sydney Hospital in November, 1950.

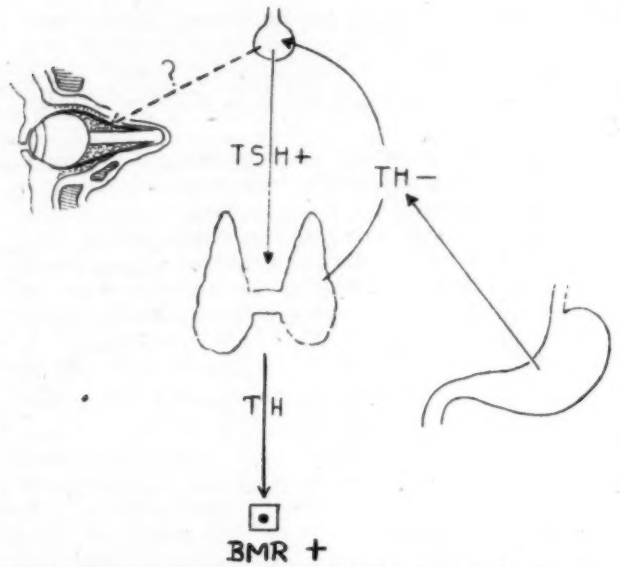


FIG. 1.—Diagram of the pituitary–thyroid axis. T.S.H. = Thyroid stimulating hormone. T.H. = Thyroid secretion.

Thus, in Fig. 2, modified from Cope *et al.* (1947), the degree of shading indicates the secretory activity. For example, the normal gland is moderately shaded, but the diffusely enlarged gland of Graves's disease, which is of course secreting more hormone, is jet black.

The interesting point is that the gland tissue surrounding the toxic adenoma is shown as shrunken and pale and therefore inactive compared with the normal. Thus, excessive thyroid secretion from the adenoma, inhibiting

FIG. 2.—1. Normal gland. 2. Diffuse hyperplasia. 3. Hyperfunctioning single adenoma with atrophic uninvolved gland. (Cope *et al.*, 1947.)

the anterior pituitary, causes inactivity and shrinkage of such gland tissue as still remains under physiological control. The treatment of toxic adenomata should clearly be surgical, the neoplastic nodule being resected with a layer of the surrounding tissue. But a radical bilateral operation is obviously unnecessary and inadvisable.

Quite recently, also, there has been a rather exciting approach, on the basis of this pituitary–thyroid axis, to the treatment of classic thyrotoxicosis. We cannot give thyrotoxic patients more thyroid hormone, but it is hoped that closely related compounds, such as tetrabromthyronine and tetrachlorthyronine, which do not stimulate the metabolism much, may yet retain the particular chemical linkage which inactivates the anterior pituitary. These are now being tried in large doses by Lerman and Harington (1949).

Eye Signs

It is known that injections of pituitary T.S.H. cause exophthalmos in guinea-pigs, but what part, if any, T.S.H. plays in the eye signs of human thyrotoxicosis can still only be guessed at. I shall not go into these eye signs in detail, but one or two points may be mentioned.

The first is that, though we talk about the "eye" signs, the eye itself is normal. The clinical appearances all depend on changes in the orbital tissues behind the eyeball.

There are three categories of eye signs, which, with the related orbital tissue changes, are shown in Table III.

TABLE III.—*Table of Eye Signs and Related Orbital Tissue Changes*

Eye Sign	Orbital Tissue Changes
1. Lid retraction (retraction of the upper lid)	Spasm of the striated levator palpebrae superioris
2. Protrusion of the eyeball (exophthalmos) and lids	Enlargement of the orbital tissues due to deposition of fat in classic Graves's disease. ? Oedema in "malignant exophthalmos"
3. Ophthalmoplegia	Fatty and round-cell degeneration in extrinsic eye muscles

Lid retraction, or, more precisely, retraction of the upper lid, depends on spasm of the striated levator palpebrae superioris; exophthalmos and bulging of the lids depend on overcrowding of the orbital cavity by the enlarged orbital tissue. The enlarged contents cannot escape backwards out of the closed bony orbit, so they push the eyeball and lids forwards. Ophthalmoplegia, which is much more common than is generally recognized, seems to be related to the fatty and lymphocytic degeneration found in the extrinsic eye muscles in Graves's disease.

The only ocular change to benefit much from controlling hyperthyroidism is lid retraction. Where lid retraction is the dominant eye sign there is good cosmetic improvement after thyroidectomy or thiouracil. But it is different with exophthalmos and ophthalmoplegia. These are both aggravated if anything by controlling hyperthyroidism.

Fig. 3 shows the average effect of thyroidectomy on ocular prominence in nearly 40 consecutive thyrotoxic patients (Rundle, 1945). In each case pre-operative readings of ocular prominence were subtracted from post-operative readings and the results averaged. It is clear that the eye becomes about 1 mm. more prominent

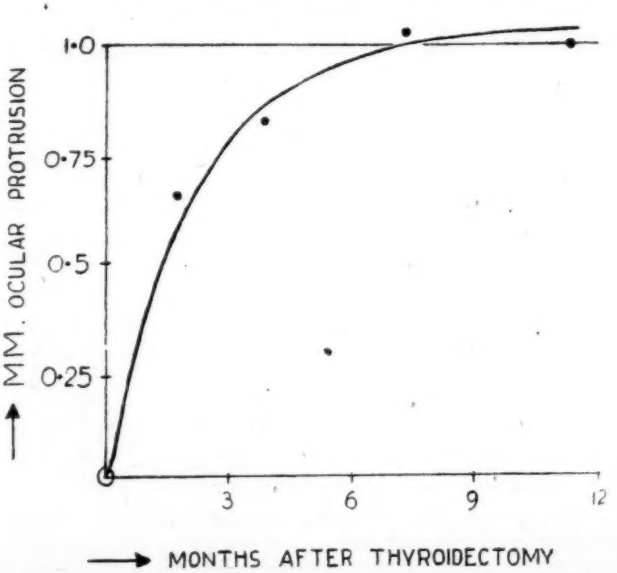


FIG. 3.—Showing average effect of thyroidectomy on ocular prominence.

than previously during the year following thyroidectomy; so, where exophthalmos and ophthalmoplegia predominate, the prognosis for cosmetic benefit should be guarded. Of course the central lesion in thyrotoxicosis is hyperactivity of the thyroid, and control of this thyroid hyperactivity transcends all else in therapeutic importance.

Systemic Pathology

The pathology of uncomplicated and complicated cases of thyrotoxicosis is summarized in Table IV, which takes into account the intensity of thyrotoxicosis and

TABLE IV.—*Systemic Pathology of Thyrotoxicosis*

System	Thyrotoxicosis slight——→severe, prolonged	Thyrotoxicosis plus local or associated diseases
Cardiovascular	Tachycardia——→Auricular fibrillation congestive failure Anasarca	Early cardiac breakdown or "masked hyperthyroidism," e.g., angina pectoris
Central nervous	Hyperexcitability——→Acute thyrotoxic delirium	Organic reaction types of psychosis, if predisposition
Endocrine	Low sugar tolerance	Diabetes, if diabetic anlage
Muscular	Weakness——→Thyrotoxic myopathy	Relation to myasthenia gravis and periodic paralysis
Bone	Decalcification——→spontaneous fracture	
Alimentary	G.I. hypermotility——→G.I. crises with vomiting and diarrhoea	
Lymphatic	Lymphoid hyperplasia, thymic enlargement	
Cutaneous		Localized pretibial myxoedema

the state of the end organ. In essence, thyrotoxicosis causes cellular exhaustion in all the systems. It is a chemical disorder; there is remarkably little structural damage. So, if we can eradicate the chemical intoxication, recovery is immediate and gratifying. Of course any local or associated disease will remain and must be taken into account in the prognosis.

In the cardiovascular system, for instance, poisoning of the myocardium produces effects ranging from simple tachycardia to auricular fibrillation and congestive failure with oedema, even where the heart was previously healthy (Kepler, 1932). No distinctive histological lesions are found in the myocardium (McEachern and Rake, 1931). And if there is associated cardiac disease (for example, mitral stenosis or coronary sclerosis) failure may be precipitated by relatively minor degrees of thyrotoxicosis. In fact, thyrotoxicosis may be overlooked as in "masked hyperthyroidism."

Similarly, in the nervous system there is every manifestation from hyperexcitability to acute thyrotoxic delirium, which is a true chemical toxic confusional state. And if there be a psychopathic personality even slight or moderate thyrotoxicosis may precipitate one of the organic reaction types of psychosis. Similarly, in the endocrine system, diabetes may develop if the patient has a diabetic anlage. With this approach we can work out interesting correlations between the intensity of the thyroid intoxication, the functional reserves of the various systems, and the total clinical state of the patient.

Management of Thyrotoxicosis

Now what is the management of the ordinary patient who presents herself with thyrotoxicosis? Should we, or should we not, use the antithyroid drugs? I believe the answer is emphatically yes, that we should use the thiouracils in every case of thyrotoxicosis: with the thiouracils the toxic goitre can be quickly converted into a non-toxic goitre.

In fact, at the present time the practical management of thyrotoxicosis should proceed by the following steps.

First, all toxic goitres should be converted into non-toxic goitres by antithyroid therapy. Secondly, time should be allowed in the euthyroid state for full physical rehabilitation to occur. Thirdly, depending on the individual, a decision should be made for thyroidectomy or for antithyroid therapy as the definitive treatment. The chief considerations here are the patient's psychological, social, and economic backgrounds and how likely is recurrence at some time after the cessation of the drug.

The ideal is to admit the patient to hospital for three or four days right at the beginning unless she is bordering on crisis and therefore should not be moved. Table V summarizes what is done during this initial short stay in hospital.

TABLE V.—*Management of Thyrotoxicosis*

1. Careful history taking—especially social, economic, and psychological factors.
2. Examination—characters of goitre, evidence of systemic damage or of local or associated disease.
3. Measurement of lid retraction, ocular prominence, eye movements.
4. Metabolic rate, haematological examination, etc.

By daily conversations we can establish psychological rapport and get to know the patient as an individual, which counts for so much in treatment. We can also get a fairly accurate assessment of the severity of the thyrotoxicosis at the outset. The patient is then discharged on a daily dose of about 200 mg. of methylthiouracil or the equivalent dose of an allied agent.

Studies by Stanley and Astwood (1947) have shown that the methylthiouracil is about twice as potent as thiouracil, and more than two and one half times as potent as propylthiouracil. But, curiously enough, all three have generally been given in the same dosage. In other words, the dosage of methylthiouracil has been unnecessarily heavy; when used in amounts of 200 mg. daily the response to it is quite adequate and the risk of toxicity is minimal. Nevertheless the patient is told to omit the tablets and report at once if there be sore throat, malaise, temperature, or rash. However, there is certainly no need to dilate on these occasional effects or to intimidate the patient: she reports weekly for observation of subjective improvement, change in the character of the goitre, improvement in the weight and pulse rate. In addition it is useful to check the metabolic rate every fortnight and to measure the ocular changes monthly.

When the patient is euthyroid she is switched to a maintenance dose of 100 mg. of methylthiouracil daily. She is kept on this maintenance dose in a euthyroid state until she recovers all her lost weight and strength. Usually such ambulatory treatment lasts at least two months.

Definitive Treatment

A decision on the definitive line of treatment has usually been made during the initial period in hospital.

In considering thyroidectomy it should be emphasized that preparation with the thiouracils has changed the whole complexion of thyroidectomy and its results. Since we are removing a non-toxic goitre from a physically fit and rehabilitated subject there is no need whatever for haste. Perfect anatomical exposure and perfect haemostasis are the watchwords. We can then identify the parathyroids and recurrent nerves and preserve them. The amount of gland to be left behind can be assessed deliberately. The mortality rate should be virtually *nil*, and the patient need stay in hospital only eight to nine days altogether.

The decision for definitive antithyroid therapy or thyroidectomy depends on the individual patient and the therapeutic facilities available. So far as the individual patient goes, I do not believe that any rule of thumb such as, "Operate on nodular goitres, treat the diffuse ones with thiouracils," will give us the best results. Whatever the characteristics of the goitre, thyroidectomy is the better treatment for what might be called the chronic psychosomatic patient. We may recognize this chronic psychosomatic patient from details of the personal and social histories. There are excessive anxiety, nervous tension, domestic and economic difficulties, and previous evidence of maladaptation or physical disintegration. Thyroidectomy is especially indicated if the goitre be large and thyrotoxicosis severe, or if it is aggravating some associated disease, such as mitral stenosis, or diabetes.

At the other end of the spectrum no one would wish to urge surgery on the young patient with a short history, a small goitre, and mild thyrotoxicosis, especially if its onset was associated with some epochal or other self-limited stress, and especially, too, if the other personal factors are favourable. It is also obviously necessary to employ the antithyroid agents definitively in the patient who refuses operation, or if thyrotoxicosis is only a minor factor in the total clinical picture, or where organic mental disorder looms large.

Medical or Surgical Management?

So far as the available therapeutic facilities are concerned it must be admitted that there is little to choose between really expert medical and really expert surgical management. So that, if we only have the choice between expert medical management and inept surgery, our choice is clear. But medical management, to give its best results, must be individual and indefinitely prolonged. Too often, after a gratifying preliminary response to thiouracil, the patient becomes "lost," as illustrated in the following case.

A married woman aged 26 developed symptoms of thyrotoxicosis shortly after the birth of her second child. The first child had died during the pregnancy and she had also lost her father shortly before. She was treated in the medical department of a big metropolitan hospital and responded well to methylthiouracil. When she again became pregnant she was transferred to the obstetric department. Though antithyroid therapy was omitted during most of her pregnancy, she remained fairly well. After her confinement she was so occupied with the household and her children that she stopped attending hospital altogether.

Finally, in January, 1950, nearly three years after its first onset, she again presented with full-blown Graves's disease. She was shaky, irritable, easily tired, and had lost 14 lb. (6.4 kg.) in the six weeks prior to attending.

On physical examination she presented all the signs of severe thyrotoxicosis, including a diffuse pulsatile goitre, marked tachycardia, tremor, muscular wasting, and hyperexcitability.

After preparation with methylthiouracil and iodine, bilateral subtotal thyroidectomy was done. She is now relieved of her symptoms and the need for continued treatment.

It is precisely because of such patients that many of us think that surgery is the most practical, expeditious, and sure method of controlling hyperthyroidism in the majority of cases. In his recent presidential address to the American Goiter Association, Haines (1950) also reaches this conclusion after research into the results of modern treatment.

When physical rehabilitation is complete the thiouracils are discontinued and the patient is put on Lugol's iodine 5 min. (0.3 ml.) thrice daily. On the twelfth day, 48 hours before operation, she is readmitted. The haemoglobin, white cells, and metabolic rate are checked the day before operation and, if satisfactory, thyroidectomy is done. It must be emphasized that really conscientious and prolonged medical treatment gives such a high percentage of excellent results that we, as surgeons, must raise our sights to the target of perfection if we are to justify and maintain our dominant place in treatment. Our aims should therefore be: (*a*) no tetany, no nerve lesions, and a minimum incidence of post-operative hypothyroidism or recurrent thyrotoxicosis; (*b*) the patient should not need to stay in hospital more than nine days in an uncomplicated case; and (*c*) the scar should be at necklace level and scarcely visible.

Radio-iodine Therapy

Finally, we may say a word about radio-iodine therapy. Such therapy, though at present largely limited to special centres in the United States, may be expected to become more generally available in the next decade, and, unless unforeseen objections arise, it should prove an extremely simple, safe, and cheap method of controlling hyperthyroidism. Moreover, the goitre usually undergoes fibrosis and disappears. The greatest difficulty is to estimate the dose required. Overdosage leads to irrevocable myxoedema. Present indications are that it is an easy and effective method of treating the patient with severe cardiac or other complication, especially if elderly. Furthermore, toxic diffuse goitres are distinctly more responsive than toxic nodular goitres (Haines, 1950; Moe *et al.*, 1950; Richards *et al.*, 1950).

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A NOTE ON MANTOUX SENSITIVITY IN SICK CHILDREN

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The Mantoux test is of peculiar value to the clinical paediatrician, for a positive reaction often decides a diagnosis in favour of tuberculous disease. The chief drawback to the test is that the significance of a positive reaction is not a constant. The incidence of active disease among positive reactors varies with the age and background of the patients; it varies also from country to country, from town to town, and probably from decade to decade. When a sick child in hospital is found to have a positive Mantoux the weight to be given to that finding must be judged against the background of the Mantoux state of the particular hospital's child population. Each paediatric unit must form its own criteria and adjust these from time to time. In the case of our own department the figures are weighted by a special interest in tuberculous meningitis and by the exceptionally good general health of the children in our region.

This note records a simple method of assessing the significance of the reaction for clinical purposes among children admitted to our wards.

Methods

Every child admitted is tested for tuberculin sensitivity. On admission a controlled jelly test is applied in the scapular region of the back. The jelly used contains 60% v/w old tuberculin. The skin is cleansed with acetone or with methylated ether; the jelly is applied direct and covered with strapping. The strapping is removed after 48 hours and the reading is made after a further 48 hours. A Mantoux test is also made by injecting 0.1 ml. of 1:1,000 old tuberculin into the skin of the palmar surface of the forearm. Particular care is taken to ensure that a true intradermal injection is made.

The response to these tests is recorded in a book kept in every ward. The following facts are noted about each child: (*a*) Name and hospital number; (*b*) age at the time of testing; (*c*) response to 1:1,000 Mantoux; (*d*) response to jelly test; (*e*) final diagnosis reached; (*f*) evidence of active turberculous disease; (*g*) history of past tuberculous disease; (*h*) evidence of healed tuberculous disease; and (*i*) history of contact with tuberculous infection.

From these facts tables are made quarterly and yearly, showing the relationships between positive and negative reactions, age, diagnosis, and presence or absence of active or inactive tuberculosis. These tables then form a background against which to judge the significance of the test in a given case.

Results

The results of testing a consecutive unselected sample of 836 children admitted to our wards between May, 1949, and July, 1950, are given.

Of the 836 children, 39 (4%) were not tested, because they had been discharged or had died within 48 hours. There remain 797 cases for analysis.

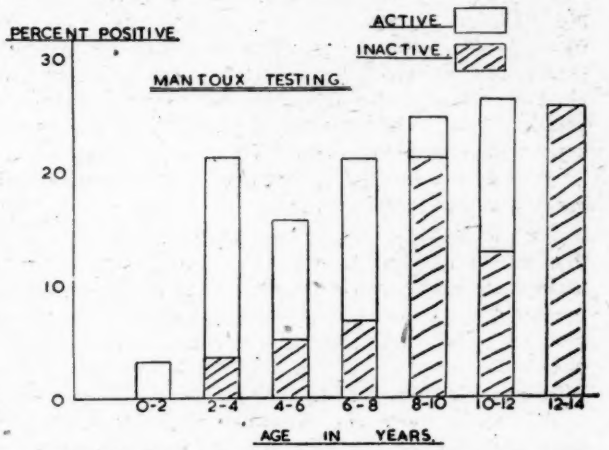

FIG. 1.—Incidence of positive reactors in two-year age groups.

Fig. 1 shows the incidence of positive reactors in each two-year age group. The columns are divided to show the percentage of positive reactors with and without evidence of active tuberculosis. A small number of the positive reactors had had previous known tuberculous disease; the remainder were assumed to have passed through a silent conversion. It will be seen that the incidence of silent conversion rises with age, but even in the oldest group it does not exceed 27%. Fig. 2 and the Table show the distribution in terms of three age groups: 0–3 years, 3–7 years, and 7–14 years. Of 271 children under 3 years, only three whose reactions were positive lacked evidence of active tuberculosis. Two of these had previously been under treatment for active disease, leaving one child among the 20 positive reactors in this age group who had undergone conversion without a diagnosed tuberculous illness.

Below the age of 3 years, 85% of positive reactors had active tuberculosis at the time of the test. Between the ages of 3 and 7 years, although the overall incidence of positive reactors rose to 18.3%, the incidence of active disease in those positive was still 81%. Thus demonstrable active tuberculosis was present in more than four-fifths of our patients under 7 years who had positive reactions. Over the age of 7 years there was a sharp change. The significance of a positive reaction was, in fact, almost exactly inverted compared with the younger group. Only 28% of those over 7 with positive reactions had active tuberculosis, whilst in 72% the infection was presumed healed or latent.

The age of 7 was of course chosen arbitrarily as a convenient dividing line, but there was, in fact, a sudden sharp rise in the incidence of inactive positive reactors at this age. It therefore seems that in our particular hospital population a positive Mantoux reaction in those under 7 years demands a very careful search for active disease, and that this search is rewarded in most cases.

All children who have converted at this early age should clearly be followed for a number of years. It is our practice to send the names of these early converters, even if they lack active disease, to the tuberculosis authority so that their families may be investigated. The source of the infection in small children is usually within the home, and it is hoped that liaison between children's departments and tuberculosis officers

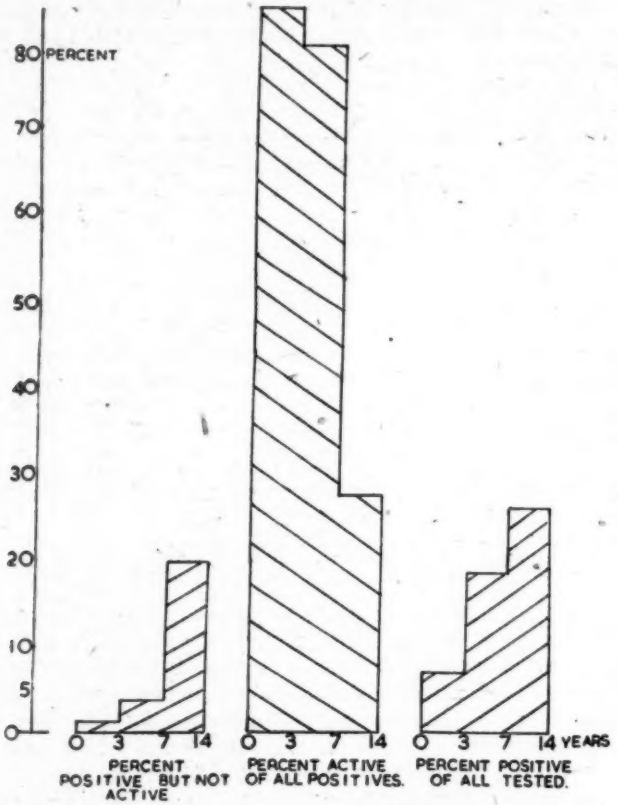

FIG. 2.—Percentage of positive reactors, with and without evidence of active tuberculosis, in three age groups.

Age	No. Negative	No. Positive	Positive with Active T.B.	Positive but Inactive	% Active of All Positive	Total Tested
0–3	251	20 (7·3%)	17	3 (1·1%)	85	271
3–7	209	47 (18·3%)	38	9 (3·5%)	80·8	256
7–14	198	72 (26·6%)	20	52 (19·2%)	27·9	270
Totals	658	139	75	64		797

may be an economical method of case-finding among tuberculous parents.

The figures collected by the method described are intended chiefly to provide criteria for judging the significance of a positive Mantoux reaction within a certain group of children at a given time. The records do, however, promise to provide facts of more general application. Some of these points are briefly mentioned.

Negative Reactions.—In this sample of 797 sick children there was no case in which active tuberculosis was associated with a negative reaction to a 1:1,000 Mantoux. There is no doubt that such reactions do occasionally occur—for example, towards the end of an overwhelming tuberculous infection and during certain exanthemata—but they are rare and detract little from the value of the tests in clinical paediatrics.

Severe Reactions.—We have seen severe necrotic lesions following Mantoux-testing in small hypersensitive children. The initial jelly test acts as a safeguard against this danger. In addition, since the 1 : 1,000 dilution appears to give accurate results, we avoid, so far as is possible, the use of the 1 : 100 and 1 : 10 dilutions.

Jelly Testing.—In our wards we have occasionally met a succession of negative jelly tests among Mantoux-positive children. These failures have usually been traceable to a batch of jelly kept too long before application. It is now our practice to test any suspect batch on the skins of children known to be sensitive to tuberculin. The jelly test seems to be reasonably accurate: of 139 children reactive to the 1:1,000 Mantoux, more than 90% were positive to the jelly. With an accuracy of this order the jelly forms a useful control against the occasional lapse in the technique of setting up and reading the Mantoux test.

The Period of Safety

McDougall (1949) has stressed the remarkable freedom from manifest tuberculosis that occurs in that "period of safety"—the years about puberty. This feature is evident even in our highly selected hospital population. Comparison of age group 12–14 with group 10–12 in Fig. 1 illustrates this point: although the incidence of silent conversion rose from 13 to 27%, the older group yielded no cases of active tuberculosis, whilst in the younger group half the positive reactors had active disease.

This period of safe conversion marks also the upper age limit of our children, so that the group is bounded at the lower end by an age group in which tuberculous infection appears almost always to result in manifest disease, and at the upper end by a group of high resistance.

Summary

A simple method of recording the results of routine Mantoux tests on sick children is described.

The method and results are illustrated by an analysis of 836 consecutive admissions.

In more than four-fifths of those under 7 years a positive reaction was associated with active tuberculosis. Only one example of silent conversion was found among 271 sick children under 3, 20 of whom were positive reactors.

Only 28% of all positive reactors over 7 years had active disease.

A negative reaction to 1:1,000 Mantoux, with a negative reaction to a jelly test as an additional safeguard, is likely to exclude, for practical purposes, all cases of active disease in this age group.

It is suggested that the weight given to a positive Mantoux reaction in a sick child demands a knowledge of the Mantoux state of one's own patients as a whole. The routine testing of all patients, and the regular analysis of the results obtained, provide a rational framework for clinical judgment. Each centre must, however, form its own criteria of significance and make appropriate adjustments from time to time.

Our thanks are due to Dr. Hugh Ellis for permission to include his patients in this series, and to successive house-physicians in the children's wards for their conscientious recording of the data on which this note is based.

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The largest prefabricated timber house ever exported from Sweden, a hospital unit with a length of 250 metres, will shortly be shipped by Amals Sagverks AB to the city of Poitiers, France. The hospital, which will accommodate 250 in-patients, also includes operation-ward, kitchen, dining-rooms, and lounges, also staff quarters and a chapel. No less than 75 standard railway cars are required for transporting the materials by land.

A CASE OF MONILIASIS

BY

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AND

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Warnings on the danger of the newer antibiotics (*British Medical Journal*, 1951) have referred to the occasional development of moniliasis. A case of moniliasis of the oropharynx which spread to the bronchi and has apparently developed in the course of intensive and extensive antibiotic treatment of maxillary sinusitis with penicillin, streptomycin, and "aureomycin" may therefore be of some interest.

Case History

An unmarried woman aged 49 was quite well until May, 1950, when she had a bad cold which did not clear up. She was given penicillin by her own doctor and was later seen by Mr. P. E. Roland, to whom we are indebted for details of the earlier findings. He found both nares occluded by a fibrinous membrane. Repeated cultures grew a *Staphylococcus aureus*, at first sensitive to both penicillin and streptomycin. Systemic courses of both drugs caused temporary improvement only, and she remained under medical supervision, as malignancy had been suspected.

A biopsy taken in June, 1950, of some soft tissue from the posterior pharyngeal wall showed chronic inflammation and no evidence of malignancy. She was again admitted to hospital owing to an exacerbation of her condition in September, 1950. A penicillin-resistant *Staph. aureus* was now grown from the nose, and she was treated with aureomycin. She also received deep *x*-ray treatment. A biopsy of the nasopharynx showed oedematous and largely necrotic material, but no evidence of malignancy or tuberculosis. There was some clinical improvement.

In December, 1950, however, she suddenly developed an oedema of the left orbit. She was again put on aureomycin and the left orbit was explored. No pus was found in the orbit or left frontal sinus, but the incision started to discharge. Penicillin, streptomycin, and heparin were given, in addition to the aureomycin she had been receiving. There was only little improvement in her condition, and for the first time yeast-like bodies were found in the purulent discharge. On February 23, 1951, she was admitted to the Royal National Throat, Nose and Ear Hospital in London.

Clinical Findings.—The patient was a frail woman weighing 7 st. (44.5 kg.), as compared with 10 st. 6 lb. (66.2 kg.) a year before. Lesions resembling erythema multiforme lesions were found on the extremities. The lids of the left eye were inflamed and there was some periorbital oedema. Pus was discharging from the sinus above the internal angle of the eye. In the right naris there were adhesions between the septum and the middle turbinate. The left cavity was filled with pus and scabs; there was some ulceration of the nasal mucosa. Several ulcers 1–2 cm. in diameter were seen on the soft palate, the uvula, and the back of the tongue. A radiograph of the chest on February 28 showed considerable consolidation of the right lower lobe. Bronchoscopy revealed a large quantity of fetid pus in the bronchi, and the right bronchus showed some sloughing. A great deal of purulent crumbling matter was aspirated for investigation. The patient's condition appeared to have improved after the bronchoscopy.

Treatment.—Penicillin and streptomycin were given. In view of the bacteriological findings the ulcers of the oral cavity were painted with gentian violet, and potassium iodide was given orally. This treatment seemed to have a beneficial effect.

Bacteriology.—Direct smears from the ulcers of the palate, from the nose, from stools, and, in particular, from the bronchoscopy aspirations showed crowds of yeast-like bodies and mycelia. Cultures yielded a profuse growth of *Candida albicans*. Fermentation tests:—Glucose: acid and gas. Maltose: acid and gas. Saccharose: *nil*. Lactose: *nil*.

Animal Inoculation.—Intravenous injection of 1 ml. of a saline suspension killed a rabbit (weight 2,000 g.) in three days. There were characteristic miliary abscesses in the kidneys and myocardium. Subcutaneous injection of 1 ml. of the above suspension produced a large subcutaneous abscess which healed spontaneously within a fortnight. Routine cultures from bronchial aspirations also grew penicillin-resistant *Staph. aureus* and streptomycin-sensitive *Pseudomonas aeruginosa*. Tubercle bacilli were not seen in the sputum. An autogenous vaccine of the *C. albicans* was being prepared, when the patient developed a severe haemoptysis and died on April 1.

Summary of Post-mortem Findings

Oral Cavity and Upper Respiratory Tract: Multiple ulcers of palate, uvula, back of the tongue, and nasal cavity. Suppuration in maxillary frontal and ethmoidal sinuses. *Lungs:* Extensive ulceration of right main bronchus, with perforation and haemorrhage mainly into the left lung. Diffuse bronchiectasis and suppurative bronchitis with confluent organizing bronchopneumonia of the right lung. Large penetrating abscess of the right lower lobe with organizing empyema. *Intestinal Tract:* No ulceration seen. *Cultures* from bronchi, ulcers of palate, nasopharynx, ethmoid, and intestines yielded a heavy growth of *C. albicans*. Penicillin-resistant *Staph. aureus* was grown from lungs.

The macroscopic appearance of the *right lung* was rather striking. The parenchyma was very firm and of greyish colour. The walls of the gaping dilated bronchi were greatly thickened and of an intensive white colour. Many larger bronchi were disintegrating, and one large branch led into an abscess which penetrated to the surface of the right lower lobe, causing a purulent pleurisy now partly organized.

However, we have been unable to find monilia in the sections of the lungs. There were masses of staphylococci in numerous bronchiectatic abscesses, but no yeast-like bodies or mycelia in the sections of the lung or sinuses stained with Gram or the periodic-acid-Schiff (P.A.S.) method. There were a few yeast-like bodies in sections of the ulcerated uvula.

Discussion

While it is always difficult to incriminate organisms which inhabit the human tissue as saprophytes it is recognized that under favourable conditions they may become pathogenic (Davis *et al.*, 1937). Treatment with the newer antibiotics chloramphenicol and aureomycin may prepare the ground for secondary mycotic invasion (Tomaszewski, 1951).

In our case the clinical picture and the repeated cultural findings of *C. albicans* are suggestive enough that a monilial infection has developed in the course of the treatment with various antibiotics, including several courses of aureomycin, leading to extensive ulceration of the oral cavity, the upper respiratory tract, and the right main bronchus. Diffuse bronchiectasis and suppurative bronchitis followed, with the development of staphylococcal bronchopneumonia

We are indebted to Professor L. P. Garrod for his kind interest and advice.

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PRIMARY HYPERPARATHYROIDISM (ADENOMA) SIMULATING SARCOIDOSIS

REPORT OF A CASE

BY

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Although both primary hyperparathyroidism and sarcoidosis are uncommon disorders of different aetiology, there may be a close correspondence between their clinical manifestations. The following case indicates the difficulties that may arise in differentiating the two conditions.

Case Record

A married woman aged 33 was admitted to St. George-in-the-East Hospital in May, 1950, with a provisional diagnosis of subacute rheumatism. She had had three normal confinements, her last four months previously; this was uneventful, although lactation had ceased after four weeks. During the antenatal period she had taken a multiple vitamin preparation as a clinic routine, but no extra calcium or excess of milk.

For several years she had complained of nocturnal pains in her limbs and back which had become more persistent and severe since the last confinement. During the past three weeks she had noticed swelling of her ankles at night, frontal headaches, palpitations, slight constipation, and a loss of 7 lb. (3.2 kg.) in weight. There was no history of dyspepsia, thirst, polyuria, or fracture.

She was a pale, thin woman with a congenital absence of the left wrist and hand. Her height was 5 ft. 6½ in. (169 cm.); weight 133½ lb. (60.5 kg.); resting heart rate 90 a minute; blood pressure 140/80. The right lobe of the thyroid was slightly more prominent to sight and touch than the left. There was slight injection of both conjunctivae, and a fine leash of subconjunctival vessels was visible on both nasal and temporal sides of the palpebral fissure, associated with minute crescentic opacities at the limbus.

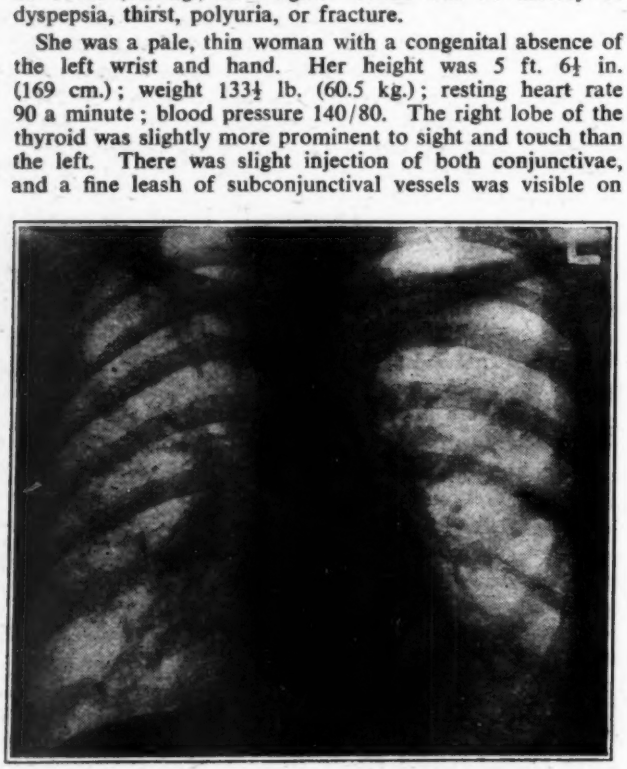

FIG. 1.—Radiograph of chest showing heavy hilar shadows, diffuse streakiness of lung fields, peripheral reticulation, and slight osteoporosis of ribs.

Investigations.—Blood examination showed: red cells, 3,500,000 per c.mm., with slight anisocytosis; Hb, 63% (9.3 g%); C.I., 0.9; white cells, 7,900 per c.mm., with a normal distribution; corrected E.S.R., 24 mm./hour (Westergren). A catheter specimen of urine was alkaline and showed a light cloud of albumin; the deposit contained epithelial cells, and a few leucocytes and red cells. Culture was sterile. The chest radiograph (Fig. 1) was reported on as follows: "The lungs are excessively streaky, apparently on account of some generalized fibrosis. The root shadows are only slightly prominent. The heart is normal in size and shape. The lungs do not appear to show infiltration." Report on a film of the right hand was as follows: "There is a large area of rarefaction in the head of the proximal phalanx of the index finger. Query the possibility of sarcoidosis" (Fig. 2). Plasma proteins: total, 6.7 g./100 ml., albumin 4.3 g./100 ml., globulin 2.4 g./100 ml.; albumin/globulin ratio 1.8/1. Serial sputum tests and gastric lavage were negative for tubercle bacilli, and the Mantoux reaction was negative at 1/1,000.

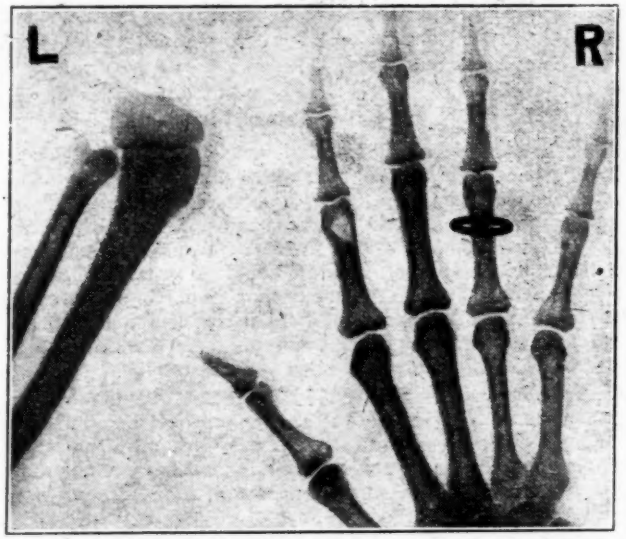

FIG. 2.—Radiograph of right hand and left stump, showing punched-out area of rarefaction in the distal end of the first phalanx of the index finger. Smaller areas are seen in the middle and ring fingers.

The chest film was reviewed, and the coarse trabeculation and radiolucence of the thoracic cage were now noted. The possibility of generalized skeletal decalcification with metastatic calcification of lungs and cornea was now apparent, and a presumptive diagnosis of hyperparathyroidism was made. The diagnosis was confirmed by the following investigations: serum calcium, 16 mg./100 ml.; plasma inorganic phosphorus, 4 mg./100 ml.; blood urea, 70 mg./100 ml.; serum alkaline phosphatase, 14 King-Armstrong units. Intravenous pyelography showed considerable calcification in both renal areas and impaired excretion of dye (Fig. 3). *X*-ray examination showed slight generalized rarefaction of all the bones of the skeleton, including the skull (Fig. 4). A barium swallow showed no abnormality.

The patient was transferred to the East Ham Memorial Hospital under one of us (H. W. S.), for surgical exploration by Mr. A. J. Heriot. Renal function tests made before operation showed gross impairment: urea clearance, 17% of average normal, with a blood urea of 92 mg./100 ml.; water dilution and concentration tests showed correspondingly low values.

Operation was performed on November 20 at a serum-calcium level of 16 mg./100 ml. (anaesthetist, Dr. A. Marsden). A normal-sized thyroid gland was disclosed with the right lobe displaced forwards by a tumour one-and-a-

half times the size of a normal thyroid lobe, lying alongside the oesophagus and on the vertebrae. It was nodular, greyish yellow in places, and had no definite vascular connexions with the thyroid. The tumour was encapsulated: it measured 5.5 by 3.5 by 2.5 cm. (Fig. 5) and weighed 17.5 g. Histologically it was an adenoma of the parathyroid gland.

Post-operative tetany was aborted by giving intramuscular calcium gluconate when indicated clinically or by the Sulkowitch test and serum-calcium level (see Table I).

The patient was discharged from hospital on December 13, 1950, symptom-free and with a normal serum calcium. Although renal damage remained as a constant hazard, her blood urea had fallen to 50 mg./100 ml. and there was no albuminuria. The lungs showed radiographic evidence of clearing and there was no macroscopic evidence of ocular pathology.

FIG. 3.—Radiograph showing calcification in both kidneys.

FIG. 4.—Radiograph of skull showing finely granular ground-glass appearance.

FIG. 5.—Parathyroid adenoma.

Discussion

This case conforms to the accepted aetiological pattern of hyperparathyroidism as regards age, sex, and the insidious nature of the symptoms. The factor of pregnancy has been correlated with the raised female incidence (3 to 1, Norris, 1947) on the grounds that a tendency to low serum-calcium levels promotes hyperplasia of the parathyroids, and thus might lead to adenoma formation (Albright and Reifenstein, 1948). That sarcoidosis might be confused with hyperparathyroidism is mentioned by Harrel and Fisher (1939) in their study of 11 cases of Boeck's sarcoid; in six cases the serum calcium was definitely raised (highest 14.8 mg./100 ml.). the blood phosphatase was raised in every case, and eight cases showed the presence of bone cysts or trabeculation of the fingers; on the other hand, the blood inorganic phosphorus was always normal, and there was definite hyperproteinaemia (above 8 mg./100 ml.) in eight cases, with reversal of the albumin/globulin ratio in all cases during the active phase. A remarkable case that illustrates the occasional similarity between the two conditions is recorded by Albright and Reifenstein (1948), who state: "Since there may be bone changes, high serum phosphatase levels, hypercalcaemia, hypercalcuria, and kidney stones associated with Boeck's sarcoid, this condition may in rare instances be mistaken for hyperparathyroidism."

Walsh and Howard (1947) describe ocular lesions of two types, identifiable by slit-lamp only, that were observed in patients with hypercalcaemia. In one type glass-like particles were seen in the conjunctiva of the palpebral fissure area; the other type was similar to band keratitis with hazy corneal deposits running concentrically with the limbus on either the nasal or the temporal side, or both. It is interesting to note that they found these lesions in two cases of sarcoidosis. Further details of these cases are given by Cogan, Albright, and Bartter (1948), who describe what they call band keratopathy and calcification of the conjunctiva in 18 cases of hypercalcaemia, four of which were due to hyperparathyroidism and two to sarcoidosis. The changes were visible to the naked eye and were analogous to nephrolithiasis or so-called nephrocalcinosis, which was present in many of the patients. In Scadding's (1950) series of 16 cases of sarcoidosis, 13 of which were confirmed by histological evidence, the variety of lung changes commonly found is described.

The chest radiograph of our case (Fig. 1) combines many of the radiographic features of pulmonary sarcoidosis. We feel that the possibility of hyperpara-

TABLE I.—*Tests Employed to Detect Post-operative Tetany. It will be noted that the results of the Sulkowitch test bear no relation to the serum calcium estimations. (The arrows denote time at which injections were given)*

Nov.:	19	20 Operation	21	22	23	24	25	26	27–30
Serum Ca mg./100 ml. ..		16	14	7	9	13			10–10
Sulkowitch:									
Cloudy	+	+++	+++	+++	++	+	++++	++ +	+ + +
Clear					++ +	++++		+	
Ca gluconate 10 ml. 10%				↑	↑↑ ↑	↑ ↑	↑	↑	

thyroidism with metastatic calcification of the lungs should be entertained whenever sarcoidosis cannot be confirmed by tissue biopsy. The risks of hypercalcaemia, etc., as a result of calciferol treatment of sarcoidosis would appear to support this contention.

The significant points of correspondence in hyperparathyroidism and sarcoidosis are best illustrated by reference to Table II. The value of serum-protein estimation as an aid to differentiation may be clearly seen.

TABLE II.—*Indicating the Close Correspondence that May Occur Between the Findings in Hyperparathyroidism and Sarcoidosis. For Details see Text*

	Hyperparathyroidism	Sarcoidosis
Bone Changes	Generalized decalcification, cystic areas, or nil	Localized decalcification, cyst-like areas in bones, of hand, feet, and occasionally spine, or nil
Serum calcium	Generally raised	May be raised
Serum phosphorus	Low—except with retention by damaged kidneys	Usually normal; may be raised by associated renal changes
Alkaline phosphatase	Raised, with bone changes	May be raised (liver, etc.)
Serum proteins	Normal or low. A./G., normal	Raised; hyperglobulinaemia. A./G., inverted in active phase
Urine	Hypercalcuria and albuminuria may occur in both disorders	
Kidneys	Metastatic calcification or stones	Sarcoid lesions or associated stones
Heart	Similar cardiographic changes are described	
Lungs	Radiographic similarity may occur	
Eyes	Metastatic calcification and band keratopathy may occur	

Summary

A case of primary hyperparathyroidism due to adenoma is described.

The apparent similarity between the findings in this case and those occasionally encountered in sarcoidosis is emphasized from the point of view of diagnosis.

Our thanks are due to Mr. A. J. Heriot and Dr. F. Young for their help and co-operation from the surgical and pathological aspects. We gratefully acknowledge the assistance given by Dr. I. H. Fothergill and Dr. J. Maidment for pathological and clinical investigations at St. George-in-the-East Hospital. We are indebted to Dr. F. G. Nicholas for permission to quote his *x*-ray reports and to Dr. A. Craner for the radiographs here reproduced.

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According to a report in the *New York Times* (December 3) the Automobile Club of New York stated recently that each year about two million American youths reach the driving age and only about one in every eight is properly taught to drive. In an effort to reduce the death rate on the roads many high schools and civic organizations have set up free driving clinics for students. They are taught both how to drive and the laws of the highway, together with the reasoning behind them. Unfortunately, however, says the article, there are far too few of these schools, and the great majority of these young drivers depend upon the guidance of friends or parents, who teach them just enough to gain a driving licence and no more. If, on the other hand, they can be persuaded to participate in a group plan that is really conducive to road safety, then a great step towards lessening the number of avoidable accidents would be achieved.

MONOCYTIC LEUKAEMIA AND PULMONARY TUBERCULOSIS COMPLICATING PREGNANCY

BY

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In view of its rarity the following case is considered worthy of record. Williams (1948) first reported a case of acute monocytic leukaemia and pregnancy, the patient (aged 35) dying within 12 days of caesarean section. Two cases of monocytic leukaemia and active tuberculosis have been reported (Heller and Hiles, 1946). In one of their cases, that of a man aged 70, there was no evidence that the leukaemic infiltration had been associated with reactivation of the tuberculosis, which involved the pleurae, pericardium, lymph nodes, and the lumbar region.

Case History

The patient was a married woman aged 25. Her father died of tuberculosis in 1933. Symptoms of pulmonary tuberculosis developed in January, 1947, and after the birth of her first child in April she became acutely ill and febrile, extensive active bilateral cavitated disease being shown by *x*-ray examination. In May the sputum was positive. She improved steadily on streptomycin, which was discontinued in September (244 g. in 122 days). The disease remained quiescent.

She became pregnant again in 1948, and was admitted to the Grove Park Hospital antenatal unit on September 14, when slight hypertrophy of the gums was noted. These became markedly swollen and spongy by September 25, and the haemoglobin had by then decreased from 12.5 to 8.4 g.%. There were 29,800 white cells per c.mm., with 11,600 monocytes, and monocytic leukaemia was diagnosed. A blood transfusion of 6 pints (3.4 litres) of packed cells was given. On November 6 she was delivered normally of a healthy female child, with a blood loss of 15 oz. (425 ml.). The gums then became almost normal and all the white cells returned to a normal figure, except the monocytes, which remained at 2,000–3,000 per c.mm. Her condition remained good, but within five weeks of delivery sputum culture showed tubercle bacilli, although there was no radiological change.

At the end of February, 1949, the leucocytes began to increase rapidly, and by the middle of April they numbered 26,000. In early May, after a mild "coryza," she became much worse. The gums swelled again and developed purplish "granulomatous" masses. The left tonsillar gland was enlarged and tender. The spleen could not be palpated. By the middle of May the total leucocyte count was 96,000, and the monocytes and polymorphs each numbered about 30,000 per c.mm., with many immature forms of both series present. Her temperature was 100° F. (37.8° C.), and there were marked coarse rales over the left upper chest. Urethane (1 g. thrice daily), a blood transfusion of 3 pints (1.7 litres), and penicillin were given. There was a temporary remission in mid-June, when the leucocyte count fell to 23,000, but petechiae and ecchymoses reappeared. Streptomycin (1 g. daily)—the organisms being still sensitive—and a third transfusion of 4 pints (2.3 litres) were given, but the leucocyte count rose to a maximum of 111,000 and the haemorrhages increased. The patient became rapidly weaker and died suddenly from a haemorrhage into the medulla oblongata on July 16.

Investigations.—Radiographs of the chest indicated progressive healing of a diffuse bilateral fibrocaseous tuberculosis.

The sputum was tubercle-negative in the last two months of life. On November 11, 1948, a report on the sternal marrow described it as "a very active marrow in which almost half the cells are members of the monocyte series." On June 10, 1949, a further report on the sternal marrow stated: "The most numerous cells are large abnormal myelocytes. Erythropoiesis shows a megaloblastic picture simulating pernicious anaemia. The process suggests a monocytic leukaemia of Naegeli type." Bleeding time: ear, 20 minutes; finger, 5 minutes. On June 10, 1949, the coagulation time was 2 minutes and the platelets numbered 20,000 per c.mm.

Necropsy

"Generalized purpuric and petechial haemorrhages throughout the body. Left pleural effusion (blood-stained). Extensive pleural adhesions. *Lymph nodes:* Tonsils and paratracheal glands necrotic. Abdominal glands enlarged and pale greenish in colour. *Lungs:* Extensive but healing fibrocaseous tuberculosis. A ragged necrotic cavity ½ in. (1.25 cm.) in diameter at apex of left lower lobe. Spleen and suprarenals very soft. *Brain:* Small haemorrhages in right parietal lobe, in right occipital lobe, and in upper medulla, with bleeding into fourth ventricle."

Histology.—Lungs showed extensive leukaemic infiltration. The tuberculous areas gave no evidence of reactivation even where a walled-off calcifying caseous focus was infiltrated by monocytes. Leukaemic infiltration was present in the liver, spleen, brain, and lymph nodes, with a subretinal deposit in the left eye. The sternal marrow was almost grey and showed displacement by mononuclear cells; foci of erythropoietic tissue were not seen. (There had never been any evidence of tuberculous infection of the bone marrow.)

The infant was healthy at birth and had a normal blood count on October 6, 1949, when 11 months old.

Discussion

This case was considered to be a true leukaemia rather than a tuberculous leukaemoid reaction, particularly in view of (*a*) the high white-cell count; (*b*) the widespread leukaemic infiltration in the lymph nodes and the viscera, which were free from tuberculosis; and (*c*) the massive cellularity and anaplasia of the bone marrow.

The remission appears to have coincided with parturition. Remissions have, however, been observed to follow closely on transfusions of fresh blood (Whitby, 1949). These may therefore have contributed to the remission in this case, which lasted four months, although the monocytes increased first in the peripheral blood, but after a mild infection there was a rapid rise in the myelocytes. Urethane appeared to produce a decrease of leucocytes of both myelogenous and monocytic series, but this remission may be related to the second transfusion. A further course of urethane and a third transfusion had no effect. In spite of the positive sputum five weeks after delivery, at necropsy there was no evidence of reactivation of tuberculosis. It seems likely, therefore, that a small focus was reactivated at or soon after parturition and later became quiescent and remained so. This is interesting in view of the statement that tuberculosis is a not infrequent complication of myeloid and lymphatic leukaemias (Whitby and Britton, 1946).

My thanks are due to Dr. M. H. Logg for permission to publish this case; to Dr. M. M. Nagley (Grove Park Hospital) for much advice; to Mr. Alistair Gunn (obstetrician), to Dr. E. H. Bailey (pathologist) and his technician, Mr. E. J. White, for the pathological work; and to Dr. J. C. White and Dr. J. W. Crofton (British Postgraduate Hospital, Hammersmith), Dr. C. W. L. Jeanes (Greenwich Chest Clinic), and Dr. J. H. Simmons (Lewisham Hospital).

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Medical Memoranda

Perforated Lymphosarcoma of Small Intestine

Perforation of a sarcoma of the small intestine is a rare complication of this disease. Ullman and Abeshouse (1932) reported two cases with this complication out of a total of 126. Lewis (1939) reported six cases out of a total of 400, while Kenneth Frazer (1945) reported three perforations in nine cases of sarcoma. In view of these figures it was felt that the following case is worthy of publication.

Case Report

The patient, a man aged 47, was admitted to hospital on May 7, 1950. He gave a history of 14 days' pain in the right iliac fossa; the pain was colicky in nature, but he did not feel sick, and his appetite remained good.

On the day of admission he had eaten a good dinner, but vomited immediately afterwards. His abdominal pain started at this time. He was seen by his own doctor at 6 p.m. on the same day, when tenderness in the right iliac fossa was noted and his temperature was 99.4° F. (37.4° C.) and his pulse rate 90.

He had a long journey to hospital, coming from the Tweed Valley to Newcastle-upon-Tyne. He was seen shortly after admission, at which time he had generalized abdominal rigidity; his temperature was 102.1° F. (38.9° C.) and his pulse rate 110. A pre-operative diagnosis of peritonitis was made, probably due to a localized appendix abscess which had subsequently perforated. No mass could be palpated owing to the generalized rigidity.

At operation under general anaesthesia a muscle-cutting incision was made in the right iliac fossa. On opening the peritoneum, purulent fluid was found, especially in the pelvis; this was aspirated. The appendix was then inspected and found to be normal, except for injection of its peritoneal surface. On further exploration of the abdomen a mass was found in the lower ileum. It was delivered into the wound and found to be perforated. There were massive glands in the omentum, extending up to the porta hepatis.

The tumour was resected, together with a wedge of mesentery. It was noted at the time of section that there were numerous miliary-sized nodules in the mucosa. In view of the lymphatic spread no attempt was made to excise the bowel wide of these nodules. An end-to-side anastomosis was performed and the wound was closed with drainage into the pelvis.

Post-operatively the patient was treated by aspiration and intravenous glucose saline infusion until flatus was passed. He was also given penicillin, 100,000 units six-hourly, and streptomycin, ½ gr. (32 mg.) twice daily. These were continued for five days. He made a satisfactory recovery from the operation and was discharged to a convalescent home on May 20. He was subsequently given deep *x*-ray therapy.

The pathological report on the specimens by Dr. R. Schade is as follows: "(1) The specimen consists of a loop of small bowel approximately 15 cm. long. Over a length of 0.5 cm. it is almost completely obstructed by neoplasm which has extended through all coats of the bowel, with resultant perforation in one part. The proximal bowel is hypertrophied and the lumen throughout contains blood clot. A number of small subserosal nodules of tumour are seen. The mesenteric nodes draining the area are infiltrated by neoplasm. (2) A segment of bowel 1 cm.

long. The mucosa is roughened and shows very small miliary-sized nodules. *Histology:* This is a *lymphosarcoma* which has breached all coats of the bowel. Numerous tumour foci are present in the bowel wall well away from the main neoplasm."

Comment

It seems probable that the high post-operative mortality in recorded cases of perforated malignant tumour of the small intestine will be reduced by use of chemotherapeutic measures. Frazer reported no cases of survival after perforation.

The very short history in this case did not give rise to any suspicion of malignancy in the pre-operative diagnosis.

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Dermatitis after use of Pentavalent Arsenicals per Vaginam

Infestation of the vagina with *Trichomonas vaginalis* is nowadays commonly treated with powders or pessaries containing arsenic in its pentavalent form (acetarsol, "stovarsol"). In general practice these preparations are often used for the symptomatic treatment of leucorrhoea without examination of the discharge, and they are regarded as a stand-by in the vaginal discharges arising during pregnancy. The occurrence of dermatitis after such medication in a case of leucorrhoea in a pregnant woman serves to remind us that the administration of arsenic in any form (trivalent or pentavalent) is not without risk. The drug is absorbed from the vehicle, but it is normally easily detoxicated and excreted without difficulty. Certain individuals may, however, show idiosyncrasy, or intolerance may develop after prolonged administration.

Intolerance is shown by vasomotor crises, gastro-intestinal upsets (diarrhoea, vomiting), or toxic effects on the liver, nervous system, or skin. Pentavalent arsenic has also a specific effect on the optic nerve, producing atrophy. In general, the pentavalent form is less toxic than the trivalent (neoarsphenamine), and it is sometimes used when previous reaction to the trivalent form has been encountered, particularly in cases of skin intolerance.

Case Report

In February, 1948, a pregnant woman aged 21 was found to be suffering from syphilis. She was treated with 6,000,000 units of penicillin, followed by seven injections of "stabilarsan" over a period of six weeks (total 2.55 g.), when she developed a generalized exfoliative dermatitis, which required admission to hospital. Two months later anti-syphilitic therapy was continued with bismuth without reaction. She began a period of observation for test of cure in August, 1948, the serum tests having become negative. She miscarried six months later, and, although a blood test showed W.R. negative, Kahn one plus, and Meinicke doubtful positive, she was kept under observation until August, 1949, when she again became pregnant. A course of treatment was advised, and, after a patch test with neoarsphenamine proved to be positive, a course of penicillin, followed by bismuth, was begun. After 3,600,000 units of penicillin and 1.5 g. of bismuth she developed a generalized erythema with oedema of the eyelids on December 2. A blood count showed: red cells, 3,800,000; white cells, 15,000 (polymorphs 76%, lymphocytes 17%, eosinophils 5%, monocytes 2%); Hb, 74; C.I., 0.98. The urine showed no abnormality.

She was given promethazine hydrochloride, 0.02 g. once daily, vitamin-B complex, 3 mg. daily, with vitamin B_{12} ("cytamen"), 20 μg. daily, for five days and then 20 μg. weekly. The acute skin condition subsided by December 9, and had cleared, after a fine desquamation, by the end of the year. She was delivered on March 19, 1950, of a healthy child. The possible cause of the dermatitis was discussed with the family doctor, and it was at first thought that it might have been due to sensitization to penicillin or to bismuth (a rare complication). The patient's doctor later recalled that just before the dermatitis appeared he had prescribed "stovarsol" vaginal compound (S.V.C.) pessaries for a leucorrhoea. Seven months after the skin condition had completely cleared a patch test with S.V.C. gave a strongly positive reaction. The serum tests had now become negative and the blood picture was within normal limits. At this time, however, she had spongy gums and gingivitis.

Comment

There are few references to the effect of the pentavalent arsenicals on the skin. Michael (1929) reported a case of exfoliative dermatitis in a woman who had been treated with acetarsol for mucous colitis, and Nicolas and Rousset (1936) noted the occurrence of lesions resembling pityriasis rosea after injection with the same drug. Beatrice Kesten (1938) described five cases of sensitization following intravaginal therapy for trichomonas infestation with a powder containing acetarsol. Persistence in the treatment of these cases resulted in generalized dermatitis after warning signs in the form of a local erythema of the external genitalia and thighs. Campbell (1937) recorded a further case in a woman treated for the same condition with acetarsol tablets per vaginam. This patient had shown intolerance to trivalent arsenic during treatment for syphilis some years previously, having developed an exfoliative dermatitis after 3 g. of neoarsphenamine. She presented an itching erythematous rash on the face, neck, trunk, and limbs, which was followed by desquamation, with thickening of the palmar skin.

The case described above illustrates the development of hypersensitivity to arsenic, and has many features in common with Campbell's case, in which sensitiveness is shown to both valencies. There was no evidence that defective elimination played any part. That it was allergic in nature is perhaps supported by the response to the antihistaminic and by the moderate eosinophilia. Patch tests with both forms of arsenic were positive, but the value of the patch test is disputed: it may be worth doing if previous intolerance to the arsenicals has been shown at any time.

The simultaneous use of the antihistaminic and the vitamins appeared to limit the spread and shorten the course of the illness. Dimercaprol was not given, as the arsenical nature of the condition was not at first suspected, and, when it was, the condition was beginning to subside. The administration of dimercaprol during the former attack did not apparently lessen the length of stay in hospital.

W. E. ORCHARD, M.D., D.P.H.

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Reviews

THE NEW COSMOGONY

BY

LANCELOT HOGBEN, F.R.S.

Dr. Bronowski has written a book[1] which is notable both because of the calibre of thinking in its content and because of the quality of the writing. The latter is all the more remarkable since the author divulges what he shares with Conrad. English, of which he has a command now too rare (alas) among men of science, is not the language of his boyhood. He writes in an explorative mood likely to engage the interest of a reflective person not disposed to share all his convictions, and he is at all times agreeably suggestive, if not always wholly conclusive.

One preoccupation of his new book is to expound the world view of science in the milieu of Rutherford, Einstein, Bohr, and Heisenberg. This is the theme of several best-sellers in the late 'twenties, but his treatment of the topic is essentially different from theirs. One might read any or all of the popularizations of Jeans, Eddington, and Sullivan without suspecting that inquiries outside the domain of astrophysics or electronics enjoy a title to the use of the word science, that scientific discovery owes anything to material incentives, or that its interpretation has any organic relation to prevailing cultural values and ways of thought. Contrariwise, Bronowski writes with an effortless erudition which keeps in focus the historic environment of scientific progress, is consistently and modestly aware that organic chemistry, geology, and biology—even anthropology—aspire with some propriety to rank as scientific disciplines, views with alarm the lopsided specialization of a technocracy which has no concern for humanistic values, and makes no parade of vaguely irrelevant religiosity

Statistical Recipes

Admittedly, the new world view he expounds makes less pretence to finality than that of the age which begins with Newton and ends with Laplace. Increasingly, we regard the laws of science as statistical recipes for action. This point of view may be novel to the physicist or to the mathematician, but it was commonplace to a generation of biologists who had felt the impact of Karl Pearson's *Grammar of Science* at the turn of the century. Some of us would therefore welcome a fuller exposition of what is essentially new in the content of scientific thought of the last three decades. One may also wish to join issue with Dr. Bronowski when he follows Jeans and Eddington in unduly emphasizing the unity of the nineteenth-century cosmogony. From one point of view, nineteenth-century science witnessed a drastic reorientation away from the Newtonian outlook.

The change began before Laplace made his mark. Boulton and Watt had secured Parliamentary recognition of the first law of thermodynamics fifty years before the Royal Society refused publication to Joule's laboratory determination of the mechanical equivalent of heat, and physics increasingly exploited thermodynamical in preference to particulate concepts in the second half of the century. Victorian science remained dualistic to the last ditch. At least till 1930—and so far as I know it is still true—there was no electronic alternative to the thermodynamic theory of the gas cell. Indeed, the work of Rutherford, Bohr, and others like them reinstated the atom at a time when there were many sympathizers with Ostwald's prognosis. How often did our Edwardian teachers hint that physical chemistry might eventually discard particulate interpretations in favour of energy-costing accountancy.

None the less, it is important to emphasize how science turns more and more to statistical generalization, if only because the new temper is a signpost to a new authoritarianism. It is one of the paradoxes of our time that reckless anxiety to exploit new statistical techniques, ostensibly advanced to promote better design of experiments, accompanies the keenest high-level controversy about the rational credentials of statistical inference. The controversy proceeds in the empyrean of multidimensional geometry, and Bronowski will do a great service to us all if he undertakes in a later essay the task of elucidating the issues at stake for the benefit of the laboratory worker or physician charitably or lazily disposed to take so much highly debatable methodology on trust. Perhaps one reason why so many of them have to do so is because the mathematicians of Bronowski's generation so very rarely share his own remarkable talent for writing lucidly and painlessly.

Balance of Values

To Bronowski's appeal for a reintegration of contemporary social culture, with due regard to the needs of the whole man, every thoughtful reader will readily respond. It does not follow that they will share his nostalgia for an epoch in which the poet or painter was also a scientist and the scientist a man of letters. In the age of television, the art of painting can no longer discharge the social function of a painter of da Vinci's vintage. Since the coming of linotype, the art of poetry can no longer discharge the social function of the bard, who, as collective memory of the community, had to enlist mnemonic devices of language to accomplish less effectively the task that now devolves on a microfilm library. Need we then view with alarm and despondency the decay of the historical novel at a time when Trevelyan's exposition of social history can captivate so stupendous a public and so many readers will share the pleasure of reading what Bronowski writes?

Bronowski's plea is especially a challenge to the physician, because the sound practice of medicine uniquely calls for a nice balance between scientific judgment and humanistic values. If the problem is soluble, it may well be so when a more mature psychiatry in wedlock with the new discipline of social medicine is able to tackle the mental sickness of an urban civilization with a hypertrophied preoccupation with passive enjoyments. Perhaps in this way alone will it be possible to evaluate the right use of leisure, with less concern for the preservation of traditional values than for a deeper understanding of human satisfactions.

[1] *The Common Sense of Science*. By J. Bronowski. (Pp. 154. 8s. 6d.) London: Heinemann. 1951.

TROPICAL MEDICINE

Clinical Tropical Medicine. Edited by R. B. H. Gradwohl, M.D., Luis Benitez Soto, M.D., and Oscar Felsenfeld, M.D. (Pp. 1,647; 473 illustrations; 6 colour plates. Price £8.) London: Henry Kimpton. 1951.
Birch's Management and Medical Treatment of Children in Tropical Countries. Ninth edition. By E. H. Vere Hodge, C.I.E., B.A., M.D., F.R.C.P. (Pp. 412, with 4 appendices. Rs. 16.) Calcutta: Thacker, Spink and Co. 1951.

The first of these books is a massive tome weighing a little over 7½ lb. It is divided into 73 chapters to which 57 different authors (most of whose names will be unfamiliar to readers in Britain) contribute either individually or in joint articles. It was the policy of the editors to let younger writers have their say, to allow freedom of expression, and, with minor reservations, to impose "no curtailment of ideas or concepts."

The result is interesting, particularly to those of the older generation. The different chapters vary remarkably in their quality. The majority of those which are written from first-hand experience are good. Into this category fall the articles on Chagas's disease (Mazza), pinta (León-Blanco and Sánchez-García), and rickettsial diseases (Machiavello), to mention a few which are outstanding. In the chapter on leishmaniasis (Pessôa) an excellent section on the muco-cutaneous form of the disease is followed by a quite inadequate account of kala-azar. To do justice to the author of this chapter it must be remarked that he himself is aware of this, and indicates in his title that he is concerned mainly with the American form of the disease. A good account of tropical ulcer (Panja) comes from Calcutta. The arrangement of the section on salmonellosis is rather odd: under common headings such as "Pathology," "Clinical Symptoms," "Sequelae," etc., are consecutive paragraphs on classical enteric fever, typhoid-like fever (salmonella fever), enteritis, and so on. The baneful influence of the systematic bacteriologist has obviously been at work. In view of the immense economic importance and protean characters of malaria, the chapters on this disease are completely out of perspective. The section on treatment, for example, occupies no more than 3 pages, and of this a good deal is comparatively irrelevant. A similar criticism applies to the chapters on African sleeping sickness (13 pages) and relapsing fever (4½ pages). By contrast rhinoscleroma gets 20 pages.

To summarize, it may be said that this is a book of light and shade. It contains much of interest to all students of tropical medicine. Because of its local colour it should be a useful work of reference for the practitioner in the Western hemisphere. It cannot be recommended as a comprehensive textbook to those whose province is the world at large.

In Birch's manual we have a striking contrast to the symposium reviewed above. It is safe to conclude that a book which has survived for 107 years to reach its ninth edition must have in it some unusual quality of stability, and this can readily be confirmed by even a superficial appraisal of its contents. Originally written for the guidance of residents in India, the book has been remodelled by the present editor so that it may apply to all countries where tropical diseases prevail, and has been brought up to date to include accounts of recent discoveries such as sulphonamides and antibiotics. It is intended for mothers and nurses and also for medical practitioners going to the Tropics for the first time. In 34 comprehensive chapters and 4 appendices a fund of useful information of a simple and straightforward kind is provided on a wide range of subjects, and a good index makes it easy to find the desired information on any problem. The most critical reader will have difficulty in finding any relevant subject which does not receive its due meed of attention. This very practical book can be warmly recommended to all who are concerned with the care of children in the Tropics.

J. S. K. BOYD.

NEOPLASMS

Syllabus of Human Neoplasms. By R. M. Mulligan, M.D. (Pp. 318; 230 illustrations. £2 12s. 6d.) London: Henry Kimpton. 1951.

The author has attempted to compress into 288 pages an account not only of the gross and microscopical pathology of tumours but also of "their salient clinical features," "the embryology and histology of the cells comprising tissues and organs," as well as many statistics, descriptions of many non-neoplastic changes in endocrine glands and in organs under endocrine control, and 230 photomicrographs, most of which are large. It is doubtful whether even a master of terse diction, pruning his text of all inessentials, could usefully accomplish this task; and, alas, this book displays no such mastership. Its text is full of irritating pseudo-statistics, fragmentary clinical tit-bits, unnecessary and often questionable histological minutiae, and involved and ambiguous verbiage.

For example (p. 136), patients with carcinoma of the liver "display an abdominal mass (75 per cent), abdominal pain (70 per cent), jaundice (60 per cent), edema of the lower extremities (40 per cent), and alcoholism (20 per cent). . . . The liver usually weighs more than 2000 gm. in 70 per cent of the cases. . . . Ascites of more than 1000 cc. is found in 55 per cent, ascites of less than 1000 cc. in 30, hemoperitoneum in 25, and hemochromatosis in 5. The status of cirrhosis as an accompanying lesion is difficult to assess, since the coincidence of cirrhosis and carcinoma is difficult to separate from the incidence of carcinoma developing in the soil of cirrhosis."

Muddled statements and irrelevances of this sort occur throughout the book. It also contains much imaginary pathology: for example, that Fibiger's *Spiroptera* cancer was due to "the introduction of carcinogens as impurities on the surface of these worms" (p. 14); that glioblastoma "is often associated with tuberous sclerosis" (p. 99); that carcinoid tumours arise from "exhausted epithelial cells . . . which have failed to undergo their normal cycle of rejuvenation" (p. 136); that, when pancreatic cancer infiltrates the retroperitoneal tissues, "enough aortic stenosis may result from adventitial fibrosis to cause moderate cardiac hypertrophy" (p. 140); that "testicular tumours . . . are neoplastic mixtures of somatic, seminal, or trophoblastic elements in various stages of differentiation or they represent one-sided development of one of these three basic elements. This is true whether the theory of twinning or the theory of parthenogenesis is called upon to explain their initiation" (p. 171); and that teratomas contain "neoplastic blastodermic vesicles" (p. 173).

The sections devoted to such non-neoplastic diseases as simple warts, infective mononucleosis, sarcoidosis,

the lipoidoses, diabetes, Addison's disease, myxoedema, cretinism, and pilonidal sinus are too brief to be useful and are in any case irrelevant.

The best that can be said of this book is that most (but not all) of the photomicrographs are clear and show what is intended, that their magnifications are stated, and that the paper and printing are excellent. The text contains many misprints.

R. A. WILLIS.

PAEDIATRIC DIAGNOSIS

Diagnostik der Kinderkrankheiten. By Professor E. Feer. Sixth revised edition. (Pp. 461; 285 figures. £3 4s. 6d.) Vienna: Springer-Verlag. 1951.

When Professor E. Feer produced the fifth edition of his *Diagnostik der Kinderkrankheiten* after the war and dedicated it to his twelve grandchildren, many thought that this was the swan song of a great pioneer. But, as visitors to the International Paediatric Congress in Zurich last year realized, Professor Feer seemed determined to go on longer, and a new sixth edition of his valuable manual is evidence of his continuing interest. He has revised it extensively, and the illustrations which form such an important part of the book have been improved by using new subjects for photography or radiography. There are two good radiographs of congenital heart lesions, and in view of the interest now shown in this subject there might be more. The Pirquet method of tuberculin testing gets more space than the Mantoux or patch test, which indicates a different outlook in different countries, or perhaps it is a gesture to the paediatric school of Vienna, from which city, as with the fifth edition, this popular book has been published.

ALAN MONCRIEFF.

CHLOROFORM STUDIED

Chloroform. A Study after 100 Years. Edited by Ralph M. Waters. (Pp. 138; 35 figures. $2.75.) Madison, Wisconsin: University of Wisconsin Press. 1951.

A new book on chloroform published in 1951 has for English anaesthetists the unexacting interest of one of Mr. Michael Sadleir's excursions into Victorianism, but in Scotland it may sound as stimulatingly as John Knox's original *Blast*. It represents an investigation undertaken at the University of Wisconsin under the supervision of Dr. Ralph Waters, in which chloroform was studied by modern clinical and laboratory methods as though it were a newly introduced drug.

More than a thousand patients were anaesthetized by chloroform, and its effects were examined on the liver, kidney, and cardiovascular system. It disturbed hepatic function (as shown by laboratory tests) more than other anaesthetics, but not grossly; it had no specific ill-effect on the kidney; and there were four cases of cardiac arrest due to the anaesthetic, though all of them were restored by prompt treatment. The monograph is a true addition to anaesthetic knowledge, but it makes no clear-cut revaluation of its subject. Waters reaches the conclusion "that chloroform does not deserve to be abandoned as a surgical anaesthetic," but the authors of the dominating chapter on cardiovascular effects, though they believe the present fear of the drug is unjustified, say, "We certainly do not advocate any widespread revival of the use of chloroform," which leaves us as we were.

GORDON OSTLERE.

BOOKS RECEIVED

Review is not precluded by notice here of books recently received

Trends in Gerontology. By N. W. Shock. (Pp. 153. 20s.) London: Geoffrey Cumberlege. 1951.

Surgery of the Oblique Muscles of the Eye. By W. H. Fink, M.D. (Pp. 350. 63s.) London: Henry Kimpton. 1951.

Serum Sickness. By C. Frh. von Pirquet, M.D., and B. Schick, M.D. (Pp. 130. 28s.) London: Baillière, Tindall and Cox. 1951.

An Integrated Practice of Medicine: Progress Volume V. By H. T. Hyman, M.D. (Pp. 734. 50s.) London: W. B. Saunders. 1950.

Occupational Choice. By E. Ginzberg and others. (Pp. 271. 63s.) London: Geoffrey Cumberlege. 1951.

Medical Treatment in Obstetrics and Gynecology. By C. F. Fluhmann, B.A., M.D., C.M. (Pp. 157. 24s.) London: Baillière, Tindall and Cox. 1951.

The Doctor. By S. R. Truman, M.D. (Pp. 151. 24s.) London: Baillière, Tindall and Cox. 1951.

For the Healing of the Nations. By M. I. M. Causton, B.A., A.R.C.M. (Pp. 183. 5s.) London: The Carey Kingsgate Press. 1951.

A Guide to Professional Nursing. By B. A. Bennett, O.B.E., S.R.N., M.C.S.P. (Pp. 231. 18s.) London: Faber and Faber. 1951.

The Story of the Growth of Nursing. By A. E. Pavey, S.R.N. (Pp. 498. 20s.) London: Faber and Faber. 1951.

The Administration of Health Education and Physical Education. By J. F. Williams, M.D., Sc.D., and C. L. Brownell, Ph.D. 4th ed. (Pp. 439. 19s.) London: W. B. Saunders. 1951.

Somatic and Psychiatric Treatment of Asthma. Edited by H. A. Abramson, M.D. (Pp. 751. 84s.) London: Baillière, Tindall and Cox. 1951.

Brain Metabolism and Cerebral Disorders. By H. E. Himwich, M.D. (Pp. 451. 46s. 6d.) London: Baillière, Tindall and Cox. 1951.

Sociology and Social Problems in Nursing Service. By G. Sellew, B.S., R.N., Ph.D., and P. H. Furfey, Ph.D., LL.D. 3rd ed. (Pp. 391. 19s.) London: W. B. Saunders. 1951.

Surgical Forum. Proceedings of the Forum Sessions, 36th Clinical Congress of the American College of Surgeons. (Pp. 665. 50s.) London: W. B. Saunders. 1951.

Clinical Unipolar Electrocardiography. By B. S. Lipman, A.B., M.D., and E. Massie, A.B., M.D., F.A.C.P. (Pp. 232. $5.) Chicago: The Year Book Publishers. 1951.

The Child Guidance Approach to Juvenile Delinquency. By E. Davidoff and E. S. Noetzel. (Pp. 173. $4.50.) New York: Child Care Publications. 1951.

Précis d'Anatomie Médico-Chirurgicale. By M. Patel and others. Vols. 1 and 2. (Pp. 1,214. 4,300 francs.) Paris: Librairie Maloine. 1951.

L'Ovaio come Ghiandola a Secrezione Interna. By G. Sbarigia. (Pp. 638. No price.) Rome: Istituto Terapeutico Romano. 1951.

Lehrbuch der Inneren Medizin. By Dr. E. Lauda. Vol. 3. (Pp. 715. 60s.) Vienna: Springer. 1951.

Diagnostik der Kinderkrankheiten. By Professor E. Feer. 6th ed. (Pp. 461. 64s. 6d.) Vienna: Springer. 1951.

Tuberkulose im Kindersalter. By Professor O. Görgényi-Göttche. (Pp. 338. 59s. 6d.) Vienna: Springer. 1951.

Lehrbuch der Analytischen Psychotherapie. By Dr. H. Schultz-Hencke. (Pp. 340. M. 27.) Stuttgart: Georg Thieme. 1951.

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SURGICAL TREATMENT OF SCIATICA

Twenty years ago most patients with sciatica were considered to have an interstitial neuritis of the sciatic nerve and were treated conservatively on the basis of this false aetiological hypothesis. With such treatment the majority recovered after varying periods of disability and without compensation. In 1933 Mixter and Barr[1] showed that sciatica was sometimes the result of protrusion of one of the lower lumbar intervertebral disks into the spinal canal and the impingement of the protruded fragments upon the roots of the cauda equina. Since then it has become increasingly obvious that this is much the commonest cause of sciatica, and its surgical treatment by excision of the protruded fragments of disk tissue has become firmly established. Barr,[2] for instance, reported in this *Journal* in 1938 a series of 83 cases operated on at the Massachusetts General Hospital, with only three failures. Nevertheless the operation has not been accepted, either by patients or their physicians, as being invariably successful, and there are a number of possible reasons for dissatisfaction with the results of treatment in some cases. As with most operations, there is a definite operative risk, and a catastrophe in a young patient suffering from a non-fatal condition, with symptoms which usually disappear spontaneously, will make a deep impression on the minds of all concerned. In a certain number of operations no protrusion is found, owing either to mistaken diagnosis or to faulty surgical technique, and these patients rarely benefit. Perhaps the commonest cause of bad results is insufficient care in the selection of patients for operation: a patient whose symptoms (for example, numbness, tingling, or weakness of toes) are due largely to a past injury to one or more nerve roots and not to continuing compression or stretching of a nerve root will notice little if any improvement after operation. If the place of surgery in the treatment of these patients is to be properly defined results must be studied in large series of cases, with post-operative observation continued over a long period. While an enormous literature has grown up on various aspects of lumbar disk protrusions, relatively few careful clinical studies of large numbers of cases have been made.

The indications for operative treatment are of first importance. O'Connell[3 4] has found it necessary to operate on less than one-fifth of the patients referred to him, the others responding to conservative treatment. The only absolute indication for operation is the sudden development of severe neurological disturbance—an indication which was present in 2% of his series of 500 cases. Apart from this the need for operation is indicated by the severity of the patient's pain and the frequency of recurring attacks, the severity of pain being determined by a careful history and clinical examination. Operation is rarely advised for symptoms of less than three months' duration unless the pain is very severe or recurs at short intervals. Further, since the operation is designed to relieve nerve roots from forces which compress or stretch them, it is rarely performed for low back pain alone. Acute lumbago is usually transient, and chronic low back pain, if severe, should be treated by spinal fusion when more conservative measures fail.

The value of careful surgery in sciatica can be judged from the results reported in certain large series. Out of 400 patients Poppen[5] found that 65% had complete symptomatic relief after operation, 30% were improved, and 5% not benefited. Waris,[6] reviewing a series of 374 cases kept under observation for from one to five years, recorded that 41% were completely relieved, 50% were improved, 6% unchanged, and 1% worse. Spurling and Grantham[7] found that 40% of 327 cases were cured and that in a further 39% the result was satisfactory; in 21% the result was either a partial success or a failure. Of O'Connell's[3] 500 cases, followed up over a period ranging from one to twelve years, 61% were cured and 32% much improved; in 5% symptoms persisted, though their severity was reduced, and in 0.7% there was no improvement. Burns and Young[8] reported a series of 616 cases, of which 56% were free from pain after operation, 15% much improved, and 20% improved; in 7% the operation was

1 *J. Bone Jt Surg.*, 1941, **23**, 444.
2 *British Medical Journal*, 1938 **2**, 1247.
3 *Ann. roy. Coll. Surg. Engl.*, 1950, **6**, 403.
4 *J. Bone Jt Surg.*, 1951, **33B**, 8.
5 *New Engl. J. Med.*, 1945, **232**, 211.
6 *Acta chir. scand.* Supp 140, 1948.
7 *J. Neurosurg.*, 1949, **6**, 57.
8 *Lancet*, 1951, **1**, 245
9 Aitken, A. P., and Bradford, C. H., *Amer. J. Surg.*, 1947, **73**, 365.
10 Marble, H. C., and Bishop, W. A., *J. industr. Hyg.*, 1945, **27**, 103.
11 *Arch. Neurol. Psychiat., Chicago*, 1949, **61**, 672.
12 *Acta chir. scand.*, Supp. 144, 1949.
13 *The Intervertebral Disc*, 1945, C. Thomas, Illinois.
14 *Den Lumbrale Discusprolaps og Ligamentære Rodkompression*, 1942, Copenhagen.
15 *Brit. J. Surg.*, 1948, **35**, 225.

considered to be a failure. Although in several of these series from 80 to 90% of the patients operated upon were either cured or greatly improved, there are indications that the results are not, in general, so satisfactory. Reviews of compensation claims indicate that results of operation are poor in many cases.[9] [10]

There is a difference of opinion on the necessity for spinal fusion after excision of the protrusion. Spurling and Grantham, O'Connell, and Burns and Young consider it contraindicated except in special circumstances. Echols[11] supports this view, and it is noteworthy that the results in patients claiming compensation were even less good when spinal fusion was done. Mixter and Barr[1] and Rovig[12] describe small series of cases in which the results in the fused were better than in the unfused cases. However, fusion adds to the severity of the operation and the duration of the patient's stay in hospital, and there is at the moment no convincing evidence to suggest that it is justified in the ordinary case of lumbago and sciatica. If attempts be made to restore full movement in the spine and tone in the erectores spinae by exercises begun within 10 days of operation, there is evidence that in the majority of cases back pain will rarely be severe or disabling. But if this pain proves troublesome then fusion can be carried out at a second operation.

The published records suggest that the risks of operation are small. Bradford and Spurling[13] state that post-operative mortality is less than 1%. In Waris's series it was 1.3%, in Malmros's[14] 1.7%, and in O'Connell's 618 cases 0.32%. Of post-operative complications, wound infection is the commonest: injury to the intraspinal nerves or the large blood vessels anterior to the vertebral bodies appears to be an extremely uncommon accident. The fact that it has occurred, however, indicates to those undertaking this type of surgery the need for a gentle technique in a bloodless field.

At times operation has resulted in a satisfying relief of pain, and then, after a period of months or years, symptoms recur. Such symptoms may be due to protrusion of a lumbar disk at another level or of the same disk on the opposite side. But recurrent symptoms are most often caused by protrusion of the same disk as that previously operated upon and on the same side. This shows the importance of attempting to excise the affected disk as completely as possible at the primary operation. The incidence of recurrent symptoms of such severity as to indicate another operation varies in the different recorded series. O'Connell and Waris both mention the figure of 2%, Spurling and Grantham 5.5%. Echols suggested that its incidence may be as great as 10%, and Falconer, McGeorge, and Begg[15] have re-operated on 14% of their cases. Enough experience has now been gained to suggest that, with a thorough removal of disk tissue—on both sides in patients with bilateral symptoms—and with adequate post-operative treatment for the lumbar muscles and joints, the incidence of recurrence should not be greater than 5%.

A study of published results should go some way towards dispelling prevalent doubts about the results of the surgical treatment of lumbar intervertebral disk protrusions. When the requisite indications for surgery are present and a competent operation is followed by efficient post-operative treatment, 90% of the patients will be greatly benefited. During the last 20 years the operation has saved thousands from prolonged suffering and disability and the psychological disturbance which they may generate. In an unspectacular manner increasing knowledge of intervertebral disk protrusions has provided one of the valuable therapeutic advances of the last two decades.

THE FATE OF TRANSFUSED LEUCOCYTES

Leukaemic blood has by now been transfused into other patients either by accident or by design on a number of occasions, and in no case has the disease been transmitted to a recipient.[1] In a recent publication Lanman, Bierman, and Byron[2] break new ground, for they have concentrated not so much on the possible transmission of the disease as upon the haematological changes occurring in the recipient at the time of the transfusion and immediately afterwards. Eight experimental transfusions of leukaemic blood were given to five volunteer recipients suffering from advanced cancer. The transfusions were of the indirect type, with citrate or heparin used as anticoagulants, and the blood was given intravenously, except on one occasion when it was given intra-arterially. The transfusions lasted from 20 seconds to 25 minutes, the volumes varying from 220 to 645 ml. The transfused blood contained 80,000 to 302,000 leucocytes per c.mm., of which more than 93% were abnormal mononuclear cells. Evans blue dye was added to the transfused blood so that the dilution of the donor's blood in that of the recipient could be calculated and the theoretical rises in leucocyte counts predicted. The total and differential

1 Thiersch, J. B., *J. Lab. clin. Med.*, 1945, **30**, 866.
2 *Blood*, 1950, **5**, 1099.
3 *Proc. Soc. exp. Biol., N.Y.*, 1949, **70**, 749.

leucocyte counts of the recipient were determined at short intervals in blood from various sites—from the right ventricle by cardiac catheter, from the femoral artery, and from a peripheral vein on the opposite side to that in which the transfusion was given.

The results of these experiments were informative. The recipients' leucocyte counts rose in all cases except one to values up to 411% of the pre-transfusion count. These rises occurred within ten minutes of the commencement of the transfusion. However, the height of the leucocyte rise in arterial blood was regularly and significantly less than that predicted, the deficiency in transfused mononuclear cells varying between 21 and 113% and being noticeable within one minute of the start of the transfusion. All the evidence pointed to the transfused leucocytes being removed between the intravenous infusion point and the arterial sampling site—that is, within the pulmonary circulation. That all capillary beds may not act in this way is suggested by a single experiment in which blood was transfused into a femoral artery and counts carried out on blood withdrawn from the corresponding femoral vein; in these circumstances the mononuclear count in the blood from the vein was approximately as predicted.

A severe reaction with anaphylactoid symptoms resulted when a recipient was given a second transfusion from the same leukaemic donor after an interval of 18 days. In this case a marked leucopenia (2,633 cells per c.mm.) was observed 1½ minutes after the end of the transfusion, and it was calculated that about 40 ml. of leucocytes had quickly disappeared. If such a large number of cells were in fact trapped in the pulmonary capillaries, then this might well have caused some of the symptoms pointing to obstruction to the blood flow through the lungs, as Lanman and his colleagues suggest.

These most interesting experiments thus seem to lead to the same conclusions as those of Weisberger, Heinle, and Hannah,[8] who studied the fate of leucocytes labelled with radioactive phosphorus after transfusion into rabbits. The greatest concentration of radioactivity was found in the lungs, and large numbers of leucocytes could be seen in sections of the pulmonary capillaries. Experimental results such as these will clearly improve understanding of the physiology of the leucocytes, and in particular should throw light on the way in which the body regulates the numbers of these cells in circulation. These observations also show how in leukaemia mechanisms of cell destruction, together with undisciplined cell formation, may determine the height of the peripheral leucocyte count and explain the wide fluctuations so frequently seen.

ANIMAL RESEARCH IN EXPERIMENTAL PSYCHOPATHOLOGY

In 1921 Pavlov[1] first described the development of "experimental neurosis" during studies of conditioned responses in dogs. In certain circumstances the animals developed behaviour patterns closely resembling neurotic behaviour in man. Although such behaviour disorders had been observed in animals outside the laboratory Pavlov's cases were, in a sense, much more dramatic, since the disorders had been induced under controlled experimental conditions. They suggested to Pavlov and many to follow him that here was a technique which might add much to our knowledge of the aetiology, nature, and treatment of mental disorders.

The controls which the animal experimenter can exert over his subjects and the environment in which he places them has made it possible to study systematically the basic factors contributing to the development of these behaviour disorders. Breakdown of normal behaviour has been found to occur when incompatible responses of similar strengths are simultaneously elicited. For example, Masserman[2] trained cats to obtain their food when hungry by approaching and lifting the lid of a food box. When this response was well established conditions were changed so that approach to the food led to repulse by air blast or electric shock. The resulting incompatible inclinations to approach and to avoid the box produced striking changes in the animals' behaviour: "... somatic manifestations of anxiety in or out of the apparatus, hyperesthetic startle reactions, consistent 'phobic' responses to the feeding signals, to space-constriction, or to other meaningful configurations previously associated with the conflict situation, typical 'compulsion' and 'fixation' patterns of hiding or escape, 'narcissistic' or regressive manifestations such as excessive licking and preening, and even protracted food-avoidance and self-starvation to the point of extreme cachexia." Maier[3] observed the development of particularly persistent fixation in rats when the conflict involved two incompatible tendencies. In dogs Gantt[4] has reported extensive behaviour disturbances which continued to be strongly shown both in and out of the laboratory situation as long as 10 years after

1 *Lectures on Conditioned Reflexes: Conditioned Reflexes and Psychiatry* (translated), 1941.
2 *Behaviour and Neurosis: An Experimental Psychoanalytic Approach to Psycho-biologic Principles*, 1943.
3 *Frustration: The Study of Behaviour without a Goal*, 1949.
4 *Psychosomat. Med. Monog.*, 1944, **3**, Nos. 3 and 4.
5 *Arch. Neurol. Psychiat. Chicago*, 1935, **34**, 330.
6 Hall, C., *Sigma Xi Quart.*, 1938, **26**, 17.
7 *J. abnorm. soc. Psychol.*, 1941, **36**, 338.
8 *Amer. J. Orthopsychol.*, 1934, **4**, 203.
9 *Amer. J. Psychiat.*, 1938, **94**, 172.
10 Russell, R. W., *J. Personality*, 1948, **17**, 16.

they were experimentally induced. Similar results have been observed in laboratory experiments with goats, sheep, rabbits, pigs, monkeys, and chimpanzees. In these studies behaviour disorders produced by conflict were paralleled by disturbances in heart rate, frequency of urination and defaecation, rate of respiration, and in the nature of sexual functions. Such disturbances showed wide individual differences from animal to animal within a species and were revealed objectively in either too much or too little response or in the development of entirely new reactions, such as the persistent appearance of sexual erections.

Although such conflicts appear to be essential to the development of behaviour disorders, they alone are not completely adequate. They must be accompanied by restraint of voluntary movements, either physically, as in the case of the Pavlovian harness, or in terms of the subject's set or past learning. In the latter instance alternative responses may not be available because through habit the animal's activity is restricted to a definite sequence of responses. This characteristic of situations producing aberrant behaviour has been verified experimentally by Anderson and Liddell,[5] who found that unconfined animals developed no abnormal symptoms.

One important feature of this research has been that not all subjects develop behaviour disturbances under conflict, and those who do may vary widely in the nature of their particular symptoms. Such individual differences suggest the existence of a significant relation between genetic or constitutional factors and susceptibility to breakdown. One experimenter[6] has established that, by selective breeding, rats may within eight filial generations be divided into two groups, one very "emotional" and the other very "unemotional" in situations of conflict.

Events occurring during the early life history of the individual may also contribute to the development of behaviour disorders. Here the advantage of using animal subjects lies in the control which the experimenter can exercise over the time and nature of events to which the animals are exposed, and in the fact that an animal's complete life history can be known. For example, Hunt[7] has obtained experimental results which indicate that frustration in the feeding of infant rats leads to abnormal hoarding of food in the adult animal. Levy[8] has shown that artificially nourished puppies and calves which are not permitted to indulge in nipple-sucking to the point of satiation develop abnormal behaviour patterns, licking their paws or other objects to a degree dangerous to their health.

Systematic study of the aetiology and nature of behaviour disorders leads eventually to the question of how particular disorders, once established, may be altered. Researches on animals have frequently served as initial tests of new therapeutic techniques—as a means of studying the direct and indirect effects of such techniques on the living organism. Bini's[9] original research on electro-convulsive shock treatment, using dogs as subjects, initiated a large number of animal studies which have contributed to an understanding of the convulsive mechanism, physiological changes accompanying and following electro-shock convulsions, and the effects of such convulsions on behaviour generally.[10] A number of other familiar therapeutic procedures have been tried for the treatment of behaviour disorders produced experimentally in the ways previously described. Pavlov observed that bromides "cured" acute experimental neurosis in certain dogs in a few days. Other laboratories have reported similar effects after the administration of familiar preparations of barbiturates. Other pharmacological treatments have been tried with only temporary benefits at best. Cortin was found to diminish motor hyperactivity in "neurotic" sheep, but had no significant effects on dogs with similar behaviour symptoms. Alcohol showed some temporary effect in relieving tensions, but this did not last more than a few days after administration. Metrazol was used to induce convulsions in an unsuccessful attempt to alter fixations developed under experimental conflict.

Other researchers have experimented with techniques of a psychotherapeutic nature. Rest alone, even for extended periods, has proved generally ineffective in relieving "neurotic" symptoms. Only active attacks on the incompatible inclinations involved in the basic conflict appear to give hopeful results. Masserman has reported whole or partial success with the use of the following procedures: first, by decreasing the intensity of one of the conflictful drives; secondly, by petting and gentle hand-feeding the animal ("transference") during a re-training period; thirdly, by altering the environment and forcing the animal at the height of its hunger drive into the vicinity of the conflict situation; fourthly, by "imitation" of a "non-neurotic" animal in the conflict situation; and, fifthly, by training the animal to control the essential features of the environment, thus learning to "work through" its conflict. The one procedure which Maier has found to be surprisingly effective in altering fixations is a form of guidance or directive therapy in which the experimenter guides the animal in making the correct

responses and prevents it from performing the fixated response.

At the present time there appear to be many problems in experimental psychopathology which are beyond the reach of animal experimentation, and even the most ardent admirer of such research would not be so foolhardy as to say that the ultimate solutions to these problems lie only in the animal laboratory. However, it seems quite clear from an examination of the nature of certain of these problems that animal research should be considered as an important supplement to other procedures in the development of a systematic medical psychology.

GROWING-PAINS

In the early years of this century, when it became clear that some patients with rheumatic heart disease and mitral stenosis gave no obvious history of acute rheumatism or chorea, suspicion fell, not unnaturally, on the vague limb pains so common in childhood and frequently called "growing-pains." Many children with such pains were labelled "rheumatic" and as a result condemned to lives of semi-invalidism and to the fear that they were developing, or likely to develop, rheumatic heart disease. Careful studies, however, such as those of Sheldon[1] and Hawksley,[2] showed that such children were no more liable to develop rheumatic heart disease than others without pains. In fact, it became clear that, whatever the cause of the pains might be, they had no connexion whatever with acute rheumatism.

Naish and Apley[3] have recently made a study of children with limb pains in a further attempt to elucidate their nature and to determine whether or not more than one type of pain is included under this heading. The criterion they adopted for the diagnosis of growing-pains was a history of pains of at least three months' duration, not specifically located in the joints, and of sufficient severity to interrupt to some extent the child's normal activities. In an attempt to assess the incidence of these pains they interrogated 721 children attending certain school clinics for routine examination. By selecting for similar study the next child attending after each one with a history of pains they obtained a control series.

They found a total of 30 children with the defined growing-pains, the incidence thus being 4.2%. This is much lower than certain previous studies of children attending hospital would suggest: thus Hawksley[2] in 505 children examined at University College Hospital found an incidence of 33.6%. This difference may be due in part to different criteria of diagnosis. In addition Naish and Apley found a further 54 among patients referred to a rheumatic clinic. Because of insufficient data or organic disease nine were excluded from the analysis, leaving 75 for detailed study.

They fell into three groups. The largest (45) comprised children whose pain occurred mainly during the day, and particularly after exertion when the child was fatigued. Postural defects such as lordosis, pes planus, and scoliosis were common in this group. This association with postural defects was also noted by Hawksley, who found that simple measures to remedy these minor abnormalities frequently cured the pains. These children also appeared to have more emotional abnormalities than the controls and tended to over-react to all forms of pain—a point also noted by Hawksley. The second group (19), in whom the pain occurred mostly at night, were originally awakened with pain in the shins, calves, or thighs, severe for some minutes and then gradually fading over an hour or so, when sleep returned. Next day there might be a complaint of the limb feeling heavy. In this group there appeared to be no relationship to fatigue, faulty posture, or emotional instability. In a considerable number, however, there was a family history of growing-pains. In the third and smallest group the pains and their occurrence were not clearly defined. All children with growing-pains of whatever type gave a family history of "rheumatism" far more frequently than did the controls. As already mentioned, no evidence was found that these pains are in fact in any way connected with acute rheumatism. Neither was any special physical type of child found to exhibit growing-pains more frequently. It will be remembered that Hawksley[4] found a higher incidence in children with brown eyes and dark hair. It is noteworthy that any form of occult organic disease such as active primary tuberculosis was very infrequent in these children.

This latest study is valuable in confirming the fact that there is no longer any excuse for regarding children with these pains as suffering from a mild form of acute rheumatism and of treating them as such. It also makes it clear that there are at least two different clinical entities included in the term "growing-pain." Since it is abundantly clear that these pains are in no way connected with growth, Naish and Apley urge that the term should be discarded.

BODY FLUID IN MIGRAINE

There is some clinical evidence that attacks of migraine may be associated with retention of body fluid; a patient's rings may be difficult to remove from a finger, and local areas of subcutaneous oedema may appear in the early phase of the attack. There is also some tendency for attacks to be more frequent in the premenstrual phase, during which salt and water retention are normally induced by oestrone. Sometimes the passing of an attack is attended by a copious diuresis. Although these phenomena have long been recognized,[5] and attempts have been made to lessen the frequency of attacks by regimes designed to control body fluid,[6 7] not much attention has been given to the precise definition

1 *Disease of Infancy and Childhood*, 1936, London.
2 *British Medical Journal*, 1939, **1**, 155.
3 *Arch. Dis. Childh.*, 1951, **26**, 134.
4 Ibid., 1931, **6**, 303.
5 Wolff, H. G., *Headache and Other Head Pain*. New York, 1948.
6 Foldes, E., *Amer. J. Psychiat.*, 1936. **92**, 1281.
7 Pfeiffer, C., Dreisbach, R. H., and Raby, C. C., *J. Lab. clin. Med.*, 1944, **29**, 709.
8 Woodbury, D. M., Cheng, C., Sayers, G., and Goodman, L. S., *Amer. J. Physiol.*, 1950, **160**, 217.
9 McQuarrie, I., and Peeler, D. B., *J. clin. Invest.*, 1931, **10**, 915.

of the fluid retained and the relative proportions of water and sodium chloride. Yet this is a matter of some importance, in view of the effect of dilution of body fluid on the electro-shock threshold in the central nervous system,[8] and the effect of over-hydration in inducing epileptic attacks.[9] The observations of Dr. D. A. Campbell, Dr. K. M. Hay, and Miss E. M. Tonks, which we print on page 1424, go some way towards clarifying this point.

They found that migrainous patients show a normal response to drinking 1,500 ml. of water, so far as urine volume is concerned; but in the course of this water diuresis they lose much more sodium and chloride than normal persons. This observation in itself would suggest that dilution of body fluid may be more readily induced in sufferers from migraine than in non-sufferers, but they also found that the plasma sodium is rather high during the actual attack of migraine, and there is some evidence of blood dilution from plasma protein changes during the attacks. There is an obvious antinomy between excessive loss of salt in water diuresis and apparent increase both in the amount and the sodium content of extracellular fluid; this cannot be resolved on the data provided, and requires further observations on weight changes during the onset and disappearance of migrainous attacks. A more ambitious programme would be to assess changes in extracellular and intracellular fluid volumes from a study of sodium, potassium, and chloride balances. Meanwhile, these observations call attention to a relatively neglected aspect of a syndrome in which many of the victims are intelligent enough to be good subjects for further investigation.

PREVENTABLE BURNS

Dr. and Mrs. Colebrook[1] have estimated that about 1,000 persons are admitted to hospital each year for the treatment of burns resulting from contact with electric or gas fires, and that about 117 of these patients die (about half as many again as die each year from tetanus). Young children make up about half of this group. The burns are often particularly severe, because the commonest accident is for the clothes to catch fire, and a large area of the body surface is burned before the flames can be extinguished. In fact, accidents in which the clothes catch fire are relatively more important as a cause of death than as a cause of non-fatal injuries.[2] Girls, of course, with their clothes made from highly inflammable materials, are much more often burned in this way than boys.

Most of these accidents could be prevented if gas and electric fires were fitted with effective guards. Under the Children and Young Persons Act of 1933 parents or guardians can be fined if a child is burnt through their failure to protect it from an open fire. This has never been a very satisfactory legal safeguard, because a child has to suffer an injury before a prosecution can be brought (and no one wishes to add to the troubles of distressed parents), and there are technical difficulties about providing fixed guards for grates that have to be constantly refuelled. But gas and electric fires could quite easily be made safe by the manufacturers if they were persuaded that the extra materials and cost were justified. Unfortunately it appears that only new legislation can ensure cessation of manufacture of unguarded gas and electric fires, and Dr. Colebrook, supported by a panel of expert collaborators (including leading plastic surgeons), has used his unique knowledge of the subject to present the case for legislation in a pamphlet[3] which drives its lesson home with rational argument, as well as some grim photographs. Serious consideration of this matter in Parliament may lead to the saving of a substantial number of lives, and it was fortunate that one of Dr. Colebrook's allies in the House of Commons, Mr. D. G. Bullard, Member for S.W. Norfolk, won fourth place in the ballot for Private Members' Bills. Last week he presented a Bill to prohibit the sale of certain heating appliances without an effective fireguard. The Bill will not get a second reading until March 14, 1952, but in the meantime doctors can improve its chances of becoming an Act by giving Mr. Bullard and Dr. Colebrook their warm support.

[1] *Lancet*, 1951, **2**, 579.
[2] *An Inquiry into Accidents in the Home*, 1951. Report prepared by the Domestic Accidents Panel of the Scientific Advisory Committee of the Ministry of Works.
[3] *The Case for Legislation Which Aims at Reducing the Suffering and the Deaths Due to Accidents in the Home*. Obtainable from Dr. L. Colebrook, "Silverwood," Farnham Royal, Bucks.

"ANY QUESTIONS?"

The first selection of questions and answers from the "Any Questions?" section of the *Journal* is now available in book form. The book contains expert answers to conundrums posed by practising doctors who have needed trustworthy and above all practical advice on common problems. Sometimes the practitioner has wanted to know whether a new treatment he has read about in the journals is worth trying in his practice; sometimes he has been faced by one of those straight but difficult questions from patient or relatives for which his medical training has inadequately prepared him—"How safe is the safe period?", "Should I marry my cousin?", "What can I do to stop unsightly hair growing on my face?", "Can I get rid of these tattoo marks?"; but most often he has wanted to know what is sound, up-to-date practice in dealing with everyday clinical disorders.

"Any Questions?" was never meant as a cheap and convenient alternative to the personal consultation with a specialist. The service is not intended for unravelling the complicated case-history or a baffling chain of physical signs. Letter-box diagnosis is firmly eschewed; and indeed it would be unjust to expect that kind of assistance from the willing panel of expert advisers without whom "Any Questions?" could not exist. This section of the *Journal* is intended for questions of general interest to which the answers are not easily discoverable in standard textbooks.

The book *Any Questions?* costs 7s. 6d. (postage 6d. extra), and can be obtained from the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1. The first printing is a small one, so that early application for copies is advised.

REFRESHER COURSE FOR GENERAL PRACTITIONERS

ALLEGED RAPE

BY

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The number of cases of rape and sexual assaults on females and unnatural offences is not very large when considered in proportion to the population of this country, but, small though the number may be, the cases cause a considerable amount of anxiety to the practitioner who has to deal with them. It is, moreover, significant that crimes of this nature have shown for the last 50 years a regular and steady increase. For example, the annual average number of such crimes known to the police for successive five-year periods from 1900 to 1949 was :

1900–4	1,184	1925–9	2,303
1905–9	1,312	1930–4	2,311
1910–14	1,748	1935–9	3,001
1915–19	1,186	1940–4	3,878
1920–4	1,893	1945–9	6,235

The annual figures for the past six years show the increasing incidence even more strikingly :

1945	5,215	1948	6,795
1946	5,703	1949	7,378
1947	6,082	1950	7,993

An increase from 1,184 to 7,993—that is, an increase of more than seven times over a period of 50 years—is far too serious to be put aside lightly. Unnatural offences have increased similarly, from 216 in 1900 to 4,416 in 1950—that is, an increase of over 20 times.

The investigation of cases of alleged rape throws a great responsibility on the medical man, for the authorities are likely to give considerable weight to his report before proceeding with a charge. It is, of course, obvious that there is no charge that is more easily preferred than that of rape or attempted rape, and whatever the result of legal proceedings the reputation of the accused person may be permanently damaged, and there may be lifelong psychological disturbances in the case of the victim.

There are many reasons which impel women to bring false accusations, and there are many means whereby a guilty man may succeed in casting doubt on the veracity of his victim. In the nature of things there is commonly very little prospect of satisfactory or conclusive corroboration from ordinary witnesses to fact, hence the importance of the medical evidence.

Limitation of Psychological Damage

Cases of this nature, involving as they do in many cases quite young girls and sometimes children, require to be handled with much care. There is a great danger of psychological repercussions, and many of these may be avoided by proper examination by the physician. In the case of young children there should be as little fuss as possible, and parents and others should be warned not to get the child's mind fixed upon the assault.

The examination should be carried out as if it were an ordinary examination for medical purposes, and in children and young adults all the information available should be obtained at one examination. It is obviously very embarrassing to young women, and if more than one examination is made then the psychological trauma is multiplied. It is necessary, however, to have a complete examination ; no question of modesty should prevent the physician from making a complete examination of the whole body as well as the genitalia. It is also necessary to take a specimen from the vagina, and this, together with the whole of the information about bruising, laceration, or the obvious presence of seminal matter, should be observed and recorded, as I have said before, at one examination and one examination only.

Legal Background

Rape is regarded as a serious form of crime against the person, and the penalties imposed are correspondingly severe. Both in Scotland and in England rape has for long been a crime in Common Law, and in England it was, of course, included in the consolidating Act of 1861, which aimed at making statutory provision for all forms of offences against the person. In section 48 of that Act it is stated that "whosoever shall be convicted of the crime of rape shall be guilty of a felony, and being convicted thereof, shall be liable, at the discretion of the Court, to be kept in penal servitude for life. . . ." Though the maximum penalty is not normally imposed nowadays, the possibility remains as a reminder of the serious view still taken by the Law of a crime which was, indeed, a capital offence until about one hundred years ago. In addition, the grave moral and social implications involved must add to the weight of responsibility which often attaches to the evidence given by the medical practitioner.

By Common Law definition, rape is the carnal knowledge of a woman forcibly and against her will (or, in Scotland, of a girl below the age of 12, whether forcibly or not). In the eyes of the Law, carnal knowledge has been effected when there has been any degree whatever of penetration by the penis within the private parts of the female. Penetration need not be complete ; the hymen need not have been ruptured ; and there need not have been any seminal emission. The force exercised by the assailant must be such as is calculated to overcome the physical resistance of the victim or her capacity for physical resistance. It need not, however, consist only in the exercise of physical violence towards her, but may consist in the offering of threats such as might reasonably induce a state of terror or otherwise impair her capacity for physical resistance. Similarly, her capacity for resistance may be lowered by the use of drugs, by partial strangulation, or by general violence. It follows, therefore, that, while we usually expect to find physical evidence of resistance on the person of the female, there may be circumstances which limit the degree of resistance that can reasonably be expected, or even eliminate the possibility of physical resistance entirely.

If carnal knowledge has been effected with the consent of the female concerned, such carnal knowledge cannot constitute rape in the Common Law sense of the term, but the consent must be voluntary and comprehending. A very young girl, who is ignorant of the nature and significance of the act, cannot be expected to give a valid consent, and reference has already been made to the Scottish Common Law extension of the definition of rape to cover cases in which girls under the age of 12 years are involved. A wider development of the same principle was included in the Criminal Law Amendment Act of 1885, by which it was made unlawful to have carnal knowledge or to attempt to have carnal knowledge of girls under the age of 16 years, even with their consent. The forcible carnal knowledge of any such young girl still constitutes rape, of course, but carnal knowledge with her consent constitutes a statutory crime which, although not called rape, is of a kindred character. If the girl be between the ages of 13 and 16 years the crime is classified as a "misdemeanour"; whereas if she is under the age of 13 years carnal knowledge constitutes a "felony" ranking in seriousness alongside rape.

The Criminal Law Amendment Act of 1922 laid down that the fact that a girl might reasonably have appeared to be 16 years or over, or may have made a statement to that effect, is not a valid defence against a charge of this nature except in the case of a man of 23 years or under who is charged with the offence for the first time. The Act of 1885 also made it an offence for any person, knowing that a female was an idiot or imbecile, to have carnal knowledge of such a female, even with her consent.

Consent to Examination

It is against this legal background that the aid of the medical practitioner is invoked, and a further consideration he must bear in mind is that the female to be examined is not a "patient" in the usual sense of the term. He cannot therefore take for granted the consent to examination which he can normally assume in practice. He must obtain the formal consent of the woman to be examined, or in the case of a child the consent of her parent or guardian. In the same way, if requested to examine a suspected or accused person, the examination should be made only with the expressed consent of the man concerned. If consent is withheld the doctor should proceed no further with the case.

History

Before examining the person of the alleged victim, the doctor should obtain as much preliminary information as possible—for example, regarding the prior movements and activities of the victim and the assailant, whether they were strangers or previously known to one another, the locus and circumstances of the alleged assault, whether screams were heard or not, the subsequent movements and behaviour of the parties concerned, and so on. The extent of information available varies from case to case, and, of course, the doctor must not rely upon it as being all established fact. Much of it may prove to be quite otherwise, and many important elements may be subsequently uncovered. But as a rule the preliminary knowledge serves to orient the examiner's mind and prepare him for his first real task—namely, the obtaining of a history from the victim herself.

The victim should be allowed to tell her story in her own way, and, if possible, all relations or friends should be excluded from the room. The doctor's questions should be directed towards the filling in of details which the victim may tend to omit because they are unpleasant or indelicate, or because she regards them as irrelevant. It is essential that detailed information should be obtained: for example, regarding the amount and type of violence used; the place or places in which a struggle occurred; the nature and duration of the struggle; whether or not she screamed, and if not, why not; the positions of victim and assailant; and the experiencing of any local sensation of pain or penetration or emission, or any subsequent pain, or haemorrhage, or difficulty in micturition.

It is important that the element of time in relation to the various phases of the encounter and assault should be inquired into, and also the lapse of time between the assault and the examination itself. The reason for any undue delay should be elicited. While the history is being obtained, opportunity should be taken to note the reaction, demeanour, and emotional state of the victim, also whether there is any suggestion of pain or discomfort in her physical attitude. If there is any suggestion that drugs or alcohol have been administered, a history of the time of taking any food or drink, the taste of such food or drink, the time of onset of any symptoms, and some details of the symptoms should be elicited.

If the history is taken in this way the doctor is well apprised, before his physical examination begins, of the victim's general physique and mentality and of her capacity for resistance. He knows the degree of violence and the extent of the carnal knowledge alleged. He knows whether it is claimed that physical resistance was maintained to the uttermost, or whether there are other elements in the case which may have modified the victim's ability to resist. He will no doubt have formed an opinion of the intelligence and credibility of the victim, but even when there are peculiar or unsatisfactory features in her story he should not allow them to prejudice his mind.

General Examination

The general examination involves a close scrutiny of the whole body for marks of violence. The extent of such evidence will depend, of course, on the nature of the alleged assault and on the truth of the allegation. The more prolonged and effective the resistance of the female, and the greater the ruthlessness of the assailant's violence, the more marked will be the physical effects upon the body of the victim. Conversely, if the elements of terror or general exhaustion, or of comparative physical frailty, or enfeeblement through illness, alcohol, or drugs have played a part there may be a relative or complete absence of injury on general examination. Similarly, in cases relating to the Criminal Law Amendment Act, in which the girl has acquiesced but is under the age of valid consent, no evidence of general violence need be expected, and the same is true in many cases involving very young children, who will hardly have appreciated the nature of the act committed.

Where there has been vigorous resistance and a prolonged struggle, the commonest injuries found are bruising and scratches on the face and neck; bruising on wrists, arms, and shoulders, where the victim has been gripped or struck; bruising or abrasion on the back,

where she has been thrown down or forcibly pressed against a hard surface; abrasions on the knees and over other bony prominences if she has been dragged; bruising and scratches on the thighs and bruising about the shins and ankles sustained while the assailant has attempted to force the legs apart. When there is evidence of blows on the head, or a strong indication of partial asphyxia through pressure upon the neck, it must be remembered that the effects of such forms of violence may well have deprived the victim of any capacity to resist thereafter, and this may well explain the absence of any injuries elsewhere on the body. It is obvious how, in this and other respects, the final opinion is influenced by the correlation or otherwise between the history given by the victim and the doctor's findings on physical examination.

Local Examination

The genitalia of the alleged victim must be examined carefully in a good light. The findings will depend on the completeness and violence of the penetration which has been effected, on the age of the victim and the development of the parts, on whether she was previously a virgin or accustomed to intercourse, and on her parity.

If the victim is a young child, forcible penetration by an adult male organ will almost inevitably cause serious injury. There will be severe laceration with evidence of free haemorrhage, there will be great associated pain and shock, and the victim will be seriously ill. In the defence of such cases, if interference is admitted at all, the suggestion will frequently be that there was no introduction of the penis. The doctor should therefore endeavour to assess whether the injuries present are consistent with digital interference or insertion of any object other than the penis. More commonly, where the victim is very young, no serious endeavour has been made to effect penetration, and there may be no local injury at all, or only a slight superficial reddening and tenderness.

In older victims whose parts were still in the virgin condition before the assault, important evidence of penetration may be found in the form of a recently ruptured hymen. The hymen varies so considerably in form (see Figs. 1, 2, and 3) that great care must be taken to avoid mistakes. If examination is made within 48 hours or so of the alleged assault, however, the red margins of a recent tear will still be evident and there will still be some associated tenderness. Earlier examination may show evidence of haemorrhage from the tear. If the hymen is put on the stretch the nature and extent of the tear will be more readily manifest, and it will commonly be found that a tear, as distinct from a natural fold or crenation, extends right to the vaginal wall at the base of the hymenal attachment. It must be remembered that rape may have occurred without tearing the hymen, either because the penetration has not been sufficiently deep or, more rarely, because the hymen is unusually distensible. Where the hymen is recently ruptured, however, it is also conclusive evidence of recent penetration by some such object as the male organ, although, of course, by itself this does not necessarily imply lack of consent by the alleged victim or the use of force by the alleged assailant.

If the hymen was not in the virginal condition at the time of the assault no fresh tear is to be expected. Nevertheless, if the woman is unaccustomed to intercourse there is likely to be bruising and pain resulting from violent penetration, and any such feature must be sought and noted. If she is accustomed to frequent intercourse, and still more so if she has borne children, penetration by the male organ, even though violent, is seldom accompanied by any significant injury. In all cases the examination of the genital parts will naturally include inspection of the vulva and perineum and adjacent surface of the thighs for scratches, abrasions, and bruises caused by the hands and nails of the assailant.

Any matting of the pubic hair should be noted, as this may well be due to the presence of dried seminal fluid. If present, the matted hair should be cut and suitably examined for spermatozoa (see below). In all cases, too, it is most desirable that a sample of vaginal fluid be taken, by swab, spatula, glass rod, or other means, in order to determine the presence or otherwise of seminal fluid in the vagina. The presence of seminal fluid is by itself no proof of rape, but it is proof of penetration and emission. Immediate microscopical examination may reveal the presence of live spermatozoa—a clear indication that the penetration and emission occurred within a few hours of the examination. Smears may be made and examined at once, and the remainder of the fluid or swab can then be sent for corroborative examination. If a discharge is present a sample or swab of any such discharge should be taken so that its bacteriological character can be established by microscopical examination. If any discharge appears some time subsequent to the alleged assault, similar examination is called for, because it may be venereal in character and may furnish an important link with the assailant. If there is haemorrhage the doctor must satisfy himself regarding its origin, in particular whether it is menstrual or otherwise.

The examination of an alleged assailant must also be undertaken only with the consent of the individual. The general examination will be for signs of injury, particularly scratches, about the face and hands. The local examination, besides excluding such features as obvious sexual abnormality or incapacity, may also serve

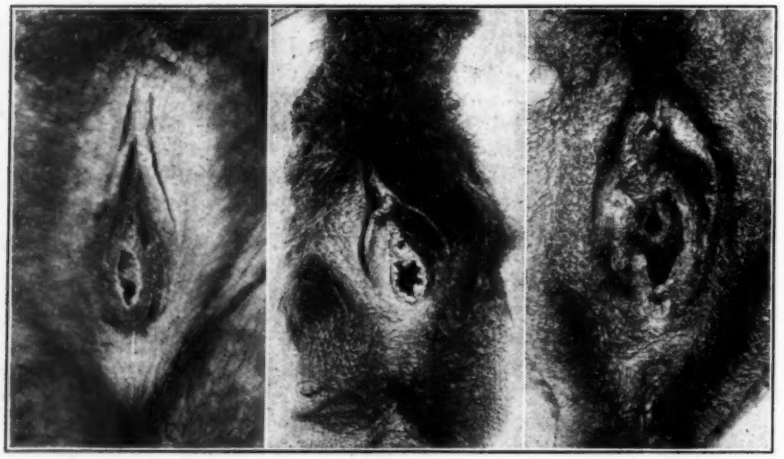


FIG. 1 FIG. 2 FIG. 3

FIG. 1.—Intact hymen, showing slight notching of the margin. FIG. 2.—Intact hymen, showing fimbriated margin. FIG. 3.—Ruptured hymen, showing tear in usual posterior position.

to prove that there has been recent emission or show the presence of blood-staining or abrasion about the genital parts.

Corroborative Evidence

Much useful evidence can often be obtained by an examination of the locus, and especially from an examination of the clothing. The clothing of the victim is examined for tears, staining with earth or vegetable matter, signs of dragging, and for the presence of blood or seminal staining. Seminal stains have a characteristic appearance when they are extensive enough and are on a good background, but small smears are often very difficult or impossible to detect with the naked eye. Examination under ultra-violet light is helpful in picking out suspicious areas. Any suspicious stain must be examined further, and, while the Florence test is valuable in that a positive result is extremely suggestive of the presence of seminal material, the only conclusive proof is the demonstration of actual spermatozoa in suitably stained smear preparations from the suspicious area. It is unlikely that the practitioner will wish to carry out laboratory tests to prove the presence of seminal matter, but if he wishes to do so the simplest chemical and microscopical tests may be carried out as follows.

A small portion of the stained material is placed on a glass slide, stained side downwards, and moistened with acidified distilled water (one drop of hydrochloric acid to 1 oz. (28.4 ml.) of water). A watch-glass is placed over the slide to prevent drying, and the preparation is allowed to stand for a certain time: old stains may require several hours, but for recent stains one hour or less will suffice. After standing, the moistened material, which may be gently teased, is dabbed lightly on several slides, which are then allowed to dry.

Before drying is complete the material on one of these slides is covered with a cover-glass and the Florence test applied. The Florence test reagent is as follows:

Potassium iodide	1.5 g.
Iodine	2.5 g.
Water	30 ml.

A drop of this solution is allowed to run under the cover-slide. In the presence of seminal material, large numbers of brown crystals, small at first but becoming larger, will be seen to form throughout the field. Under high power one or more spermatozoa may also be seen, stained brown by the iodine, in which case, of course, the test can be regarded as conclusive. More often, however, it will be necessary to stain one or more of the other smears which have been prepared. These will now be dry, and they should be fixed by passing them over a flame. Many stains have been recommended for the demonstration of spermatozoa, but the routine haematoxylin and eosin staining is quite satisfactory. In many stains the stained spermatozoa may be numerous and easily seen, but a prolonged search is often necessary. The recognition of separated heads and tails is possible, but it is advisable to search until at least one undoubted intact spermatozoa is seen. In order to avoid damaging the spermatozoa the need for gentleness in handling the stain must be emphasized, especially in transferring material to slides or in teasing the material, if this has been considered necessary.

The same staining methods are of course applicable to any smears prepared from material taken from the vagina.

The clothing of the suspected person must also be examined, and, while the presence of seminal matter may not be significant, its position may be, and it must be remembered that the blood group of an individual can often be determined from seminal stains. It is frequently possible, therefore, to determine whether the seminal stains on the clothing of the suspect have the same content of group-specific substances as the seminal stains on the clothing of the victim, and this may furnish a valuable additional piece of evidence. Grouping tests of seminal stains must be done by indirect absorption methods and are a matter for the expert.

COLD WEATHER CLOTHING FOR KOREA

[FROM A SPECIAL CORRESPONDENT]

During the winter of 1950–1 British soldiers in Korea were provided with a full range of special clothing, and the casualties from cold were not numerous when allowance is made for the very severe climatic conditions to which these men were exposed. The number of such admissions to hospital for the period November, 1950, to February, 1951, was 120, of which 66 were diagnosed initially as frost-bite, 37 as trench foot, and 22 as exposure conditions. The trench-foot cases were considered to differ from the classical condition encountered in Flanders in 1914–18. The frost-bite cases were almost entirely confined to the lower extremity, and although several men lost one or more toes there were no extensive mutilations; 14 men were evacuated to the United Kingdom because of frost-bite, and in about half of all the cases a temporary lowering of medical category was necessary. Their average length of stay in hospital was 33 days.

As a result of the experience gained last winter great efforts have been made to improve the winter clothing, and many new garments have been sent to Korea. A basic range of special clothing for "cold/wet" conditions has been provided. The term "cold/wet" covers those fluctuating climatic conditions in which the temperature is sometimes above freezing-point and sometimes below. When "cold/dry" conditions are encountered, extra or alternative garments are available. The cold/dry climate can be described in general terms as that in which the true winter temperatures are almost continually below freezing-point.

Principles of Design

The principles on which the design of the clothing is based are (*a*) provision of a water-repellent windproof external layer made of a "ventile" cloth; (*b*) the use of the layer system so as to take advantage of the high insulating value of air; (*c*) the provision of adequate ventilation; and (*d*) limitation of bulk to prevent interference with the military efficiency of the wearer.

Good ventilation is vital, as sweat condensing on the body causes loss of heat, and condensation on the inner clothing lowers its insulating value. The soldier must be able easily to open and close the apertures at the sleeves, neck, ankles, and down the front of his garments.

Clothing for Cold/Wet Conditions

In cold/wet conditions the underclothing for the upper half of the body consists of a string vest, a loosely fitting flannel shirt, and a heavy woollen jersey. The jersey may be replaced by a "combat smock liner" which is now being developed; it is a camel-fleece garment with a front that can be unbuttoned to ensure ventilation. Underclothing for the lower half of the body consists of "drawers, pyjama type," which are made of a cotton knitted fabric with an elastic waistband. There is a back opening which allows the performance of bodily functions while exposing only a minimum area of the body. Outside the drawers are worn "trousers, inner," made of a heavy knitted wool.

The outer clothing consists of a combat smock and trousers (Fig. 1), made of a windproof gaberdine material, lined throughout, reinforced at the elbows, seat, and knees,

FIG. 1. FIG. 2.

FIG. 1.—The cold/wet outfit, showing the combat smock and trousers, the open-weave insoles and boots. FIG. 2.—The cold/wet outfit with the middle parka.

and specially treated to make them waterproof. Because of the extreme fluctuations of temperature during the Korean winter, provision has been made for the "middle parka" (see below) to be worn as an additional garment. The head-dress is of the ski-cap type, made of waterproof rubberized gaberdine with a generous peak and flannel-lined ear-flaps. A hood is provided with the combat suit. The hands are protected by woollen wristlets, by three-compartment woollen gloves, and by an outer glove which protects the woollen glove from snow and damp. On the feet are worn two pairs of woollen socks, and a pair of special "boots, cold/wet," made of leather with a moulded composition sole. Inside them a special open-weave insole may be worn to increase insulation and ventilation. A pair of short puttees completes the outfit.

Clothing for Cold/Dry Conditions

Under cold/dry conditions a number of extra garments are required. First there is the "middle parka" (Fig. 2) to wear outside the combat suit. It is a jacket of water-repellent windproof cotton-gaberdine, lined with a wool pile. It has a large hood which can be worn over a combat cap or a balaclava helmet; the hood has a malleable wire at its outer edge so that the front opening can be altered to suit varying wind conditions. The parka is ventilated by opening the front, loosening the waist draw-cord and cuff straps, and by unfastening and lowering the hood. Under extreme Arctic conditions an "outer parka" can be worn over the middle parka and is similar to it except that it has an unlined hood.

But perhaps the most important change is in the foot-wear. The feet are clothed in three pairs of woollen socks, then a pair of duffel socks, made from a medium weight felt, and finally, instead of leather boots, "boots, cold/dry (Mukluks)," are worn. These are calf-high, loose-fitting canvas boots with rubber soles. They have felt and plastic insoles, the felt side being worn uppermost towards the foot.

Under both cold/dry and cold/wet conditions white over-clothing, consisting of a jacket and trousers, may be worn for camouflage in the snow, and snow-goggles are also available. Lastly, colourless lip-stick and lanoline for the exposed skin are issued to prevent chapping.

UNSOLVED MEDICO-LEGAL PROBLEMS

The British Association of Forensic Pathologists held their fourth meeting on November 24 at Guy's Hospital under the chairmanship of their president, Sir Sydney Smith. The subjects for discussion were "The Criteria of a Separate Existence" and "The Interpretation of the Signs of Asphyxia."

Separate Existence

Sir SYDNEY SMITH opened the discussion by defining the problem. In many cases there might be no doubt about separate existence, full aeration of the lungs having occurred as shown by their appearance and the fact that they floated in water. Alternatively there might be definite evidence consistent with stillbirth. However, an infant might have lived for hours or days and yet at necropsy no portion of lung tissue floated, and sometimes detailed histology failed to show definite evidence of alveolar aeration. An occasion was cited when part of the infant's body remained in the birth canal, though the infant had cried, swallowed, and breathed; so that in spite of these evidences of life it could be maintained that a legal separate existence was not achieved.

Professor G. PAYLING WRIGHT suggested the experimental approach. He referred to the physiological studies of Barcroft on the changes which occur on the establishment of respiration. It might well be that further animal experiments, perhaps using larger animals than rabbits, would be of value.

Lung Signs Unreliable

Dr. G. R. OSBORN quoted the dictum of Barcroft and Barron: "When an animal is born and begins to struggle towards a separate existence, its first efforts are those of breathing. Breathing is living. The onset of respiration is the beginning of life." His own investigations, however, had served to show the extreme difficulty of establishing that respiration had occurred by examination of the lungs, and slides of lung histology, which he demonstrated, bore this out. Among those were some showing the hyaline or "vernix" membrane lining the alveolar ducts in cases of so-called atelectasis and others which illustrated the great amount of damage to lung tissue which might be produced by resuscitation measures. Another difficulty was the effect of oedema, and also rarely intrauterine pneumonia. He felt that the presence of air in the stomach, rather than lung changes, might still prove to be one of the most valuable and constant signs indicating that breathing had occurred. Finally he pleaded for more careful handling of the lungs at necropsy from the point of view of subsequent histological examination.

A number of cases were described by different speakers showing the difficulties encountered. It was said that the statement that the lung weight increased from 1/70 to 1/30 of the total body weight after breathing had occurred had many fallacies and its value was doubted. The possibility of using biochemical changes, especially of haemoglobin, was raised, although there were obvious practical disadvantages. Dr. W. SPECTOR, on the other hand, thought that in some of these difficult cases lung histology did in fact provide a solution. One could speak of primary and secondary atelectasis; in the latter cases the vessels contained more blood in areas of lung which, though airless at post-mortem examination, had previously been expanded.

Dr. R. RICHARDS referred to recent work in Aberdeen which suggested that the presence of erosions in the gastric mucosa might come to be accepted as positive evidence of a separate existence. The erosions were probably dependent on the secretion of hydrochloric acid and were never seen in stillborn infants. Other speakers felt that more work was needed before this could be accepted.

Undiagnosed and Undiagnosable Cases

There was further general discussion and numerous cases were described, including that of an infant found in an

incinerator with blisters on the skin which were thought to indicate that it had lived. Subsequent detailed examination had proved that it had been stillborn, histological examination showing no vital reaction in the blistered areas. In another case the body of an infant was concealed in a shed or outhouse where rats devoured the cord, producing an appearance suggesting that it had separated, though in fact the baby had been stillborn.

The conclusions seemed to be that while in most cases it was possible to say that respiration had or had not occurred, and with it separate existence achieved, there were a number in which an exact decision was impossible, particularly in the presence of decomposition. In those difficult borderline cases it was probably best to say that it was impossible to express an opinion about separate existence. Dr. R. D. TEARE showed three mummified newborn children of the same mother in which such a course had been adopted.

Signs of Asphyxia

On the problem of the interpretation of the signs of asphyxia, Sir Sydney Smith again underlined the difficulties of definition and diagnosis. By derivation the word meant pulselessness (α, not; σφύζειν, to throb). In conventional medico-legal usage it meant a mode of death in which respiratory function had failed in distinction from syncope and coma, in which respectively circulatory and cerebral functions had failed. To the lay mind it meant suffocation.

Dr. C. KEITH SIMPSON showed pictures and described cases illustrating the difficulties that might arise. The classical signs, Tardieu's spots and cyanosis of lips and fingers, might appear in many conditions and were in no way specific. Petechiae and cyanosis might even be present in the stillborn infant. He instanced one case in which there had been definite evidence of an attempt to kill by suffocation, and in which the classical signs were present though in slight degree. Subsequent investigation of gastric contents had brought to light the additional factor of carbromal poisoning.

Sir SYDNEY SMITH wondered whether biochemical tests, such as an increase in arterial blood sugar, might be of value in some cases. Probably changes occurred too rapidly in this after death for the estimation to be helpful in many cases.

"Mechanical Suffocation of Infants"

Dr. F. E. CAMPS made the point that in many cases it was quite impossible at necropsy to distinguish between mechanical and non-mechanical asphyxia. Reference was made to recent work on infants in which it had been shown that in many cases where death had been presumed to be due to mechanical suffocation detailed post-mortem and histological examination had shown a variety of other causes of death, especially acute infective processes. It was agreed by several speakers that death should never be regarded as due to asphyxia from mechanical suffocation until detailed post-mortem examination, including microscopy, had excluded other causes, even though this might cause delay in reaching a decision. It also seemed generally agreed that asphyxia is an unsatisfactory term; possibly it might be replaced by the physiologically acceptable term of "anoxia" of the four types suggested by Gordon—namely, anoxic, anaemic, stagnant, and histotoxic. However, it might well be some time before the average coroner would accept, for example, "histotoxic anoxia" as the mode of death in a case of prussic acid poisoning.

In the afternoon a private meeting of the association took place to discuss informally cases of interest brought forward by various members, including an alleged case of suicide by adrenaline, poisoning by absorption of lysol, an unusual firearm wound, and attempted murder by electrocution. Before the morning meeting members and guests had an opportunity of seeing a specially arranged exhibition of forensic specimens, which included a demonstration of how the medical artist could assist in the teaching of the subject.

THE COURT AND THE SEXUAL OFFENDER

A meeting to discuss "The Court and the Sexual Offender" was held by the County of Essex Branch of the National Association of Probation Officers at Walthamstow on November 24. After a civic welcome by the mayor, the chair was taken by Dr. E. B. Strauss.

Dr. STRAUSS stressed the great contribution to jurisprudence which medical psychology had to offer, but admitted that for various reasons medical psychologists had not always succeeded in making a good impression on the Courts: their terminology was apt to be too technical, and much depended upon their powers of lucid exposition. The great need in that work was to differentiate between sin and crime.

Sir NORWOOD EAST spoke on the present position of sexual offenders. While admitting that the millennium in the criminal courts was not even in sight, there was nevertheless a growing tendency to judge humanity humanely. It must be remembered that character and conduct could change environment, and vice versa. The overt sexual behaviour of an individual depended greatly upon the effect of the surrounding cultural habits.

Sexual Perversion

Sir Norwood gave a short survey of the common perversions—fetishism, sado-masochism, transvestism, exhibitionism, homosexuality, etc. He reminded his audience that sexual behaviour was much modified by experience in early life. Sexual offenders were by no means always oversexed: indeed the cruelties of the sadist tended to increase in inverse ratio to his lack of sexual gratification. True sexual perversion had been defined as an act that persistently, either in fact or in fantasy, replaces the normal sexual aim. Even such commonplace activities as pursuit and pursuing might become perversions, taking the place of the normal sexual objective. Kinsey, on the other hand, referred to the view held by some educated persons in the U.S.A. that no sexual act was perverse in marriage if it contributed to the total sexual gratification. Many perverts were quite normal in their heterosexual relationships.

Caution should be exercised in subjecting some sexual offenders to psychiatric interview lest the suggestion of psychological invalidism resulted. Punishment and penalty might be actively desired by the insane. The mental defective was particularly liable to repeat his sexual offences, and it should be remembered that crime itself, with its anxiety and risk, might stimulate sexual desire in both women and men. A case was quoted of a woman who stole in order to obtain sexual excitement.

Sir Norwood discussed the divergent attitudes to homosexuality. Some would condone, some condemn. Some felt it unjust that legal distinction was made between this practice in males and females. Actually, a husband had recently been granted a divorce against his wife on the grounds that her lesbian relationships constituted cruelty. Latent homosexuality was not especially associated with alcoholism although it might be exposed by it. Heterosexual development might have been inadvertently repressed by undue parental warning about venereal disease, for instance. But a psychological explanation for a crime did not necessarily mean condonation. What the speaker called "copybook headings," Conscience, Religion, and Law, would always remain as deterrents.

Treatment of Offenders

There was no simple treatment for sexual offenders: it had been found impossible to explain or cure these subjects purely along endocrinological lines. Even castration of the body did not necessarily produce castration of the mind. Some use had been made of the fact that oestrogen tends to suppress male sexual desire, but there was no general remedy for sexual crimes along those lines, since most

offenders, he believed, were unwilling to be deprived of their sexual desire, and hence would not persevere with that form of prolonged treatment.

It was difficult to state the value of psychotherapy in sexual offences. Clearly a person who applied for help before committing crime was more likely to be helped than the habitual pervert. In one set of figures from Wormwood Scrubs, out of 120 selected sexual offenders 44 were deemed suitable for psychotherapy. Of these 9 were "slightly improved," 16 were "improved," and 18 very "greatly improved" or possibly cured. It was important that the courts should be able to assess the value of psychotherapy, and their ability to do so depended largely upon the clarity of the therapist's reports.

Psychotherapy upon probation might be the best possible treatment: failing that, the speaker considered psychotherapy at a special institution, as organized by the prison commissioners, held out better prospects than ordinary imprisonment.

Mr. W. C. TODD, chairman of the National Association of Probation Officers, reminded the audience that the up-to-date treatment of sexual offenders was very uncertain and varied. His society was active in keeping the public informed about these matters, in pressing for the more humane treatment of offenders, and in making every effort to get to the core of the delinquents' trouble.

Risk of Blackmail

Mr. JOHN MAUDE, K.C., in moving a vote of thanks, felt that there was great need for an authoritative, up-to-date textbook on these medico-legal subjects. For probation officers, and for those like himself who had been students at the Bar in 1920 when psychological medicine seemed to promise so much, it was disappointing to receive so little direct help from it.

He commented on the prevalent attitude of condoning homosexual practices provided they were carried out privately and between adults. In fact, homosexual males tended to congregate in various West End premises in considerable numbers: he himself deplored that lenient attitude, feeling that the practice tended to foster violence and blackmail.

Mr. W. RAEBURN, seconding a vote of thanks, expressed himself as less pessimistic than Mr. Maude about the fate of the young homosexual, and he had recently heard a similar view expounded by a well-known public-school headmaster.

A short review article in *Nature*, December 1, describes the various forms of chemical and biological warfare on rabbits in Australia. Sometimes gas is blown through burrows—carbon monoxide and carbon disulphide are used in this way—or laid in a persistent barrier at the burrow mouth ("cyanogas," chloropicrin). Digging out the burrows, or tractor ripping, is employed where the country permits. Poisoned baits are also in use, but much scientific study will be necessary to make them widely effective. So far the most startling and successful new remedy is the spreading of an infectious myxomatosis among the rabbit colonies. This naturally occurring virus disease is spread by certain mosquitoes—primarily the river-haunting *Culex annulirostris*, which bites at dusk, and also the more widely distributed *Aëdes*, which works by day. After initial unsuccessful attempts an epidemic of the disease was started in the Australian summer of 1950–1 in the Murray River valley and rapidly spread along other rivers, aided by an unusually wet summer in many parts of the north. By June, 1951, millions of rabbits had been killed over an area said to be half the size of Europe, and the disease had died down again. Much remains to be done before the method becomes fully useful. The small black fly *Simulium*, and some of the true sandflies, are also vectors of the disease, which may help its spread away from water. Immunity to the attack of the virus may develop, and this must be prevented.

Correspondence

Do You Smoke?

SIR,—The response to my inquiry on smoking sent to all men and women on the *Medical Register* has been most gratifying, and I am sincerely grateful to all those who have contributed to that result. It seems, too, that many of those replying have kindly given me more information than my deliberately few and simple questions called for. Some have written me personal letters. In thanking them I would like to point out that I may be long in answering; even with assistance it takes a long time to open and sort many thousands of letters. I beg, therefore, that I may be forgiven any apparent rudeness or neglect. I must also apologize for the omission in some few cases of a reply-paid envelope. It is, I fear, impossible to ensure 100% accuracy in the dispatch of so large a number. I would point out to the minority who have not so far replied that it is by no means too late to do so; their answers will still be most welcome and most helpful. Some may have lost the form I sent them. An answer on a sheet of notepaper or on the form reproduced below will do just as well. It should be sent to me at the London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C.1.—I am, etc.,

London, W.C.1. A. BRADFORD HILL.

Complete ONE section only and write very clearly.

Please give your name and address at the bottom of the page.

Section 1.

Present Smokers

(a) I began smoking regularly when aged.....

(b) At the present time my consumption of tobacco is about:

.....cigarettes a day.

.....ounces of tobacco a week in home-made cigarettes.

.....ounces of tobacco a week in a pipe.

(c) My age last birthday was.....

OR

Section 2.

Ex-Smokers

(a) I began smoking regularly when aged.....

When I last gave up I was aged.....

(b) My consumption of tobacco at the time I last gave up smoking was about:

.....cigarettes a day.

.....ounces of tobacco a week in home-made cigarettes.

.....ounces of tobacco a week in a pipe.

(c) My age last birthday was.....

OR

Section 3.

Non-Smokers

(a) Please tick the appropriate statement:

I have never smoked at all.

I have had an occasional smoke.

(b) My age last birthday was.....

Note.—For the purpose of this inquiry a person is deemed to be a smoker if he has ever smoked as much as one cigarette a day for as long as one year.

FULL NAME (*Block capitals*).....

(*If a married woman, please give married name as well as professional name, if different*)

ADDRESS (*Block capitals*).....

.....

Smoking and Cancer

SIR,—While evidence in favour of the carcinogenic properties of tobacco smoke continues to accumulate it seems pertinent to observe that its action must be most effective in the lung. The other part of the body most intimately in contact with tobacco smoke is the cigarette-holding fingers, usually the index and middle fingers of the right hand. Although these fingers are often bathed in smoke, and their discoloration testifies to the penetration of some element of it into the skin, so far as I know epithelioma or other malignant disease of the skin is no more frequent there than elsewhere.—I am, etc.,

Suez. HARRY KEEN.

Psychosomatic Aspects of Scoliosis

SIR,—In his discussion of the common spinal deformities in children (November 24, p. 1270) Mr. J. I. P. James describes the cause of idiopathic scoliosis as a mystery, and indeed it shares the obscurity of several other psychosomatic maladies. Its special incidence helps to an understanding of its nature. In the great majority of cases it affects young girls at the approach or establishment of puberty, its onset at a later period being unknown. It also has a special social incidence. It is not seen among the neglected children of the very poor, but is far more likely to affect the only daughter of well-to-do parents, brought up with an anxious but unwise solicitude. This peculiar social incidence was clearly recognized in former days, at a time when scoliosis was far more prevalent than it is to-day, during the period when the use of the brace and the backboard, and instruction in false modesty, formed part of the curriculum of a first-class school for girls. A book of that period gives an imaginary history of a young cottage-girl, who spends her days bent double at her tasks in the fields, but who stands up as straight as an arrow in the evening when her day's work is done. By chance she inherits fortune and position and is sent to a first-class boarding-school, where she hears the constant injunction "Shoulders back, head up," where she is subjected to backboard and brace and is visited at night to make sure that she is lying straight in her bed, and where she develops a hump as large as that of her most aristocratic schoolfellows. This fable contains much significance.

Scoliosis may be regarded as the result of defects in the upbringing of girls at the time of the approach of puberty, which brings with it profound psychological changes. The girl becomes modest, self-conscious, and sensitive. This mental state serves as a safeguard for immaturity, and when extreme it brings with it a special posture, that of bashfulness. This is normally physiological, and represents the emergence of an ancestral postural reflex, the essential feature of which is a rotation of the spine, which expresses self-effacement and conceals the lineaments of the developing form. If unwisely handled by over-anxious parents and attendants, this mental state and its associated posture may become fixed and pathological, and deformities may result. Rotation of the spine is the essential feature, and therefore, as pointed out by Mr. James, the most severe curvatures occur in the dorsal region, for it is there that rotation can most readily take place. But the process is essentially the same, and it is a matter of degree, from a transient postural curve to a severe deformity. Such spinal curvatures originating in a psychological disturbance may be compared with the bizarre attitudes of neurological origin which sometimes follow encephalitis lethargica, which are due to a perversion of postural reflexes, and which in young subjects may result in structural deformity.

An understanding of the pathology is of value in the management of the cases. Direct psychological treatment is out of place; indeed, it is the anxious parents and friends who need instruction. The girl should be placed amidst cheerful surroundings, and the posture treated by enjoyable games and exercises of a general nature, and she should have her share of the company of the opposite sex.

It would be out of place here to discuss the indications for operation in the severe progressive dorsal curvatures.—I am, etc.,

Sheffield. R. G. ABERCROMBIE.

General Practice and Psychosomatic Medicine

SIR,—I was surprised to read in your leading article "Psychosomatic Medicine" (November 10, p. 1136) of the too hasty way in which observers in this country are dismissing the theory of the psychogenic origin of disease. It appears to me that as these observers are full-time hospital consultants or hospital officers who rarely see their patients for a sufficient length of time to get to know them thoroughly, or to assess accurately their personalities, very little reliance can be placed on their conclusions. It would be very interesting to know what the experience of the average general practitioner is on this most important matter (or have we sunk so low that the opinion of the latter is of no account?). As I feel very deeply on this subject I shall endeavour to give my own experience, with the hope that other general practitioners will be encouraged to do likewise.

I came into general practice five years ago after eight years' continuous hospital experience, as a result of which I became resident surgical officer of a large hospital, and I am proud to say that my last 100 appendicectomies were performed without a death. I make this statement merely to show that I am not inexperienced and am familiar with the scientific method. I may add that in hospital very few took the slightest interest in the effect of the mind on disease processes, and I was not one of the very few.

When I came into general practice I was astonished at the number of patients coming to the surgery complaining of symptoms which were not related to any organic disease, and as more and more of these patients came to me with groups of almost identical symptoms I gradually came to the conclusion that they were suffering from anxiety neuroses of varying severity, with symptoms referred to whatever part of the body they related their anxiety to. In particular I was struck by the number of patients with cardiac, hypertensive, and digestive symptoms which were associated with anxiety states of varying severity. Many of the patients with digestive disturbances had no organic lesion demonstrable and their symptoms were presumably due to flatulence and the shifting pains caused by spasm and irregular peristalsis in the stomach and bowel. Constipation is very common in these patients, but occasionally diarrhoea is troublesome, and I have a patient who relates this symptom to periods of mental stress. Some of these patients did develop epigastric tenderness and ulcer symptoms. I also remarked that every peptic ulcer case was neurotic or suffered from increased nervous tension. In my experience the latter is usually due to the patient's mode of living, overwork, anxiety about the future, etc., and has little to do with unhappy experiences in childhood, so beloved of psychologists.

My experience of heart disease was similar, and I am now convinced that the commonest cause of heart disease to-day is not rheumatic fever but worry and nervous tension. If the anxiety state is not relieved, not only angina and coronary thrombosis may follow, particularly in the male but also, and more commonly in the female, auricular fibrillation and flutter and congestive heart failure. I have noticed the latter particularly in relation to unhappy marriages, and I have two women at the moment both of whom have had and are still enduring miserably unhappy married lives and both of whom have auricular fibrillation with no history of rheumatic fever. Despite this I think that these women have got typically rheumatic cardiac lesions; but then to-day our ideas of the causation of acute and chronic rheumatism have undergone great change, and it is becoming clear that they are the result of hormonal deficiency or imbalance, particularly of the complex hormonal system of the adrenal gland.

Chronic anxiety produces its effect partly by the extent to which the hormonal system of the body is upset, and, as hormonal harmony depends on, or is influenced by, the nervous

impulses from the hypothalamus acting on the pituitary, it is easy to see how mental imbalance with fear preponderance will affect this delicately balanced system.

The effect produced is by no means predictable, and we all know of cases of chronic anxiety of long standing which appear to escape psychosomatic disease. This is presumably because of individual differences in the way in which the emotions affect the nervous control of the pituitary and hormonal systems. Chronic overaction, underaction, or failure of any of the hormonal glands may result; and in this connexion it is easy to see how hyperthyroidism, myxoedema, diabetes, various disturbances of fat metabolism, and even Addison's disease may arise. A few years ago I had a female patient of about 60 who had been very neurotic for many years and who required considerable sedation in order to make life tolerable not only for herself but for the other members of the household. She had been in hospital on one occasion on account of her neurosis and some psychotherapy had been attempted. As she deteriorated she developed symptoms of various hormonal deficiencies: her skin became thin and dry and bruised easily so that her arms were often covered with red blotches, her subcutaneous fat disappeared, and she aged rapidly in appearance. During the last year of her life her skin developed an increasing pigmentation very similar to Addison's disease, though her blood pressure remained fairly high. Finally she developed diabetes and died as the result of a stroke. Other effects of anxiety neurosis are produced through the autonomic and systemic nervous systems as shown by increased sweating, congestion of the hands, inability to relax the muscles, blunting of sensation, and in the worst cases tremor, incoordination, and even marked ataxia.

I have had so many patients in my practice who have proved to me the importance of the psychogenic origin of disease that I strongly advise the observers mentioned in your leading article to do two or preferably three years in a practice of not more than 2,000 patients. If they then take the trouble to talk to their patients, study their personalities, and get to know them thoroughly, they will change their ideas about psychosomatic medicine and they will acquire a rich store of knowledge of human nature which will more than compensate them for their time and trouble.

When attending a refresher course recently I heard a consultant surgeon for whom I have the greatest respect declare that the scientific method was everything to him and that he would find general practice intolerable, as it would make it impossible for him to pursue his ideal. I once thought along these lines myself, but I no longer think so, for since becoming a general practitioner I have discovered that a patient has not only got a body but has also a mind, and that of the two the latter is the more important and is by far the more interesting. Perhaps one day we may discover that patients have not only got minds and bodies but may even have souls.—I am, etc.,

Stoke-on-Trent. H. H. WEIR.

Chronic Ill-health in Childhood

SIR,—Dr. S. M. Musgrave in his letter (November 17, p. 1221) referred to the possible value of vaccine therapy in chronic bronchitis occurring in children, and stated that he had seen dramatic and lasting improvement following injections with polyvalent anti-catarrhal vaccine. Since he invited the observations of other doctors on the value of this treatment I should like to relate my own experiences, small though they are. In 1948 I decided to try the effect of an anti-catarrhal vaccine on a group of children who were suffering from chronic bronchitis and who were attending a day open-air school in a South Yorkshire industrial town. For this purpose I chose a vaccine, made by a reputable firm, containing Friedländer's bacillus, *M. catarrhalis, Pneumococcus, Streptococcus* (respiratory), *Staphylococcus, C. coryzae,* and *H. influenzae.* This vaccine, incidentally, was recommended by the makers for use in chronic bronchitis.

I took 12 subjects (chronic bronchitic children, without clinical signs of bronchiectasis) and 12 controls (children with similar lesions) and arranged that they were as similarly matched as possible to avoid sampling errors. My method of using the vaccine was to inject 1 ml subcutaneously in the 12 subjects at monthly intervals over a whole period of three years, and observe any changes in the children during this period which might indicate the effectiveness or otherwise of the vaccine. The results were uniformly disappointing, despite the extraordinary length of time the vaccine was given. In no case could I honestly say that the vaccine had produced any clinical amelioration, as evinced by lessened cough, reduction in sputum, and stethoscope signs. Colds and naso-pharyngeal catarrh occurred with equal frequency in the vaccinated and non-vaccinated. Admittedly these numbers are absurdly small for the purpose of generalization, and I should therefore be glad to know whether any other readers have had successes with other schedules of vaccine treatment of this kind. In so far as the preventive aspect was concerned I attempted another experiment on my own family (two adults, two children) last year, and employed the same vaccine as above for seven months—i.e., injecting 1 ml. subcutaneously at fortnightly intervals throughout the whole period March to October—in order to ascertain whether winter colds could thereby be prevented. My hopes were buoyed until, in October, all four succumbed to the worst colds I can remember and I was prevailed upon by my wife to abandon the project forthwith under pain of family excommunication.

Before undertaking the above experiments I knew, of course, that prophylactic vaccination with mixtures of the usual pathogenic bacteria found in the upper respiratory tract had been thoroughly tested by Topley (Manchester, 1927) and Park (New York, 1921) amongst others, and had been found, for all practical purposes, to be valueless.

On reading the recent M.R.C. Report (*British Medical Journal,* June 30, p. 1463) on the whooping-cough vaccine trials at Manchester and elsewhere, it seemed to me that here was the most supreme opportunity ever presented to test the efficacy or otherwise of differently constituted anti-catarrhal vaccines, since almost 4,000 control children were to be given such a prophylactic. From these trials we have certainly learned a great deal about pertussis prevention, but, so far as I am aware, a report dealing with the anti-catarrhal aspects of the investigations has not yet been published. I sincerely hope that it will be forthcoming, as it will add another chapter to our yet incomplete knowledge of the prophylaxis of naso-pharyngeal infections, which, after all, are the starting points of chronic ill-health in thousands of schoolchildren to-day.—I am, etc.,

Sheffield. E. H. JEANES.

"Primary Atypical Pneumonia"

SIR,—In view of the interest in virus pneumonia I think the experience I had with my own family might be worth reporting.

In the summer of 1949, while down at the sea I noticed that my eldest daughter, aged 11, was running a temperature. There were no physical signs, but after a day or two she started to cough. Empirically I put her on sulphathiazole and gave her procaine penicillin each day. This made no difference to the temperature, which was, on an average, 99° F. (37.2° C.) in the morning, 101° F. (38.3° C.) at midday, and down to 100° F. (38° C.) in the evening. On my way home at the end of a week I had her radiographed and saw a shadow at the base of the left lung. Within a few days she developed signs of consolidation at the left base. Her temperature gradually settled long before her physical signs had cleared, and in three weeks, apart from persistent cough, she seemed perfectly well.

A fortnight later my wife started in exactly the same way. She also failed to respond to full doses of sulphathiazole and penicillin. Radiography showed a shadow at the left base, and she gradually developed signs at that base. Her temperature took the same course but was slightly higher, and she had paroxysms of coughing which quite exhausted her. Her temperature lasted for three weeks and left her very enfeebled, and she had lost considerable weight.

While she was getting better our 3-year-old boy started the same thing but in a very much milder form. He in turn was followed by our 7-year-old girl, who also only took a fortnight to clear up. They both developed signs at the base of the left lung.

None of them had, so far as could be seen, any upper respiratory infection. All of them developed signs at the left base. If these cases had been due to the inspiration of

infective material from the nose and throat would not the right hyparterial bronchus be the most likely passage. as in the case of a foreign body, leading to infection of the right lung rather than the left ?—I am, etc.,

Tavistock, Devon. T. M. DAVIE.

Bleeding and Perforation

SIR,—In connexion with Mr. N. S. Slater's paper (November 24, p. 1257), in which he reports three cases of haemorrhage from peptic ulcers associated with perforation, I should like to put on record the case of an old lady of 78 who was recently admitted to this hospital.

She had been well until one week before admission, when she went down with pneumonia. Her doctor ordered her admission to hospital because of the onset of severe abdominal pain. She did not complain of pain on admission, but stated that she had been passing black motions for a fortnight. On examination, she was found to be very pale, thin, and dehydrated. Her breath smelt of acetone and her urine gave an orange reaction with Benedict's solution. There was no acetone in her urine. Her chest was emphysematous and there was reduced air entry and impaired percussion note at the left lower zone. Her blood pressure was 85/30 mm. Hg, and there was some oedema of the ankles. Her haemoglobin was 22%, blood sugar 500 mg. %, blood urea 105 mg. %, the benzidine test very strongly positive, and a chest skiagram showed consolidation of the left lower lobe.

Shortly after admission to the ward she passed a large melaena stool. She was put on insulin and given three pints of blood. Next morning she was remarkably improved and was able to take a gastric diet. She did, however, continue to pass melaena stools, but did not vomit. Her haemoglobin rose to 54%.

One week after admission there was a sudden change in her condition. She became collapsed, with laboured breathing, became comatose, and died within a few hours. Her abdomen was soft and there were no material changes in her physical signs which might have given a pointer to the underlying pathology. There was no reason to believe that she was suffering from hypoglycaemia.

At necropsy a large gastric ulcer was found, overriding the lesser curvature. Its anterior part had perforated to form a hole 2 by 2.5 cm., and the peritoneal cavity was filled with a mixture of altered blood and gastric contents. The posterior part was based on the pancreas and displayed small eroded vessels in its floor. There was a carcinoma of the left lower lobe bronchus with extrabronchial spread, forming a mass 8 cm. in diameter.

I feel that this case is of interest not only because of the multiple and confusing pathology but also because it illustrates the difficulty in diagnosing a perforation in a case where, by all the rules, it should not occur—in an old lady who did not produce the classical physical signs of perforation.—I am, etc.,

London, W.10. R. EMERY.

Haemolytic Disease of the Newborn

SIR,—I have read with great interest the excellent article by Dr. W. Walker (November 10, p. 1142). I have one comment I would like to make regarding a point which is seldom mentioned, but which may be important from the therapeutic point of view. As Dr. Walker points out, there is often anaemia present in haemolytic disease without much jaundice. Anaemia can in fact be serious and even fatal with only a mild degree of jaundice. This would seem difficult to explain if the anaemia were entirely due to haemolysis, when one would expect jaundice to be obvious and to vary with the degree of anaemia. In fact, I believe it to be true that the anaemia is due to a direct suppression of bone marrow activity by the antibodies as well as due to haemolysis of the red blood corpuscles. This may seem a point of academic interest only, but I think it has a wider significance.

It often happens that a baby is anaemic enough to warrant a transfusion, and this produces an immediate improvement in the condition. However, this improvement may not be maintained, and anaemia may again gradually develop. I have myself seen several cases in which two transfusions have had to be given, the haemoglobin having dropped to a dangerous level within a fortnight of the first transfusion. This is not because the corpuscles of the first transfusion have been haemolysed at an abnormal rate but because the infant is, in fact, suffering from an aplastic anaemia and the bone marrow is not forming red cells at a normal rate.

It can therefore be seen that even after transfusion the infant must be watched carefully, and haemoglobin estimations must be done periodically, if a late calamity is to be avoided. Happily this does not often happen, but it is more likely in a severe case and it is as well to be on one's guard.—I am, etc.,

London, S.E.5. CYRIL JOSEPHS.

Foetal Hydrocephaly

SIR,—In her interesting account of the treatment of a case of foetal hydrocephaly by transparietal puncture and aspiration (December 1, p. 1320) Dr. Agnes U. Campbell may have been unaware of the article concerning this manœuvre in your issue of December 30, 1939 (p. 1273), when Dr. William More described a case similarly treated and briefly outlined the technique.

Following More's communication I have undertaken this method of decompressing the foetal skull in some dozen cases of hydrocephaly, without any untoward difficulties in performance and without any distress or complication to the patients. In all cases I have employed a lumbar puncture needle of average bore and length and aspirated the cerebrospinal fluid by an ordinary surgical suction apparatus into the glass jar, via a length of pressure rubber tubing connecting the needle to the apparatus. The amounts of C.S.F. obtained averaged 30 to 40 oz. (900 to 1,200 ml.), and the degrees of collapse of the foetal skulls so created were extreme, and in every case permitted a spontaneous vaginal delivery of the foetus. In all my cases, however, the foetus was presenting by the head, but none were in labour at the time of the procedure, although the majority went into labour spontaneously shortly afterwards, and those who did not were readily induced medically.

The risk of puncturing the bladder in these cases where the head presents is more academic than real, as the large hydrocephalic head elevates itself high above the pelvic inlet and often extends as far as and even above the umbilicus. If care is taken to empty the bladder by catheter immediately prior to the operation and the puncture is made just below the umbilicus in the midline then this risk should be eliminated completely.

A final point of warning, however, is that aspiration and collapse of the hydrocephalic foetal skull by this method does not necessarily in itself ensure a still-born baby.—I am, etc.,

Nottingham. J. B. COCHRANE.

Post-leucotomy Anxiety

SIR,—Dr. H. D. Forbes Fraser (December 1, p. 1337) complains that employers are reluctant to employ those who have had a leucotomy, but I wonder whether they are altogether to be blamed. I have recently seen a young man who developed schizophrenia during the war. This usually has a better prognosis than a similar illness appearing without stress, but for some reason he had a leucotomy. I saw him about a year later. Apparently he was perfectly normal: no hallucinations, delusions, feelings of influence or reference, variations in mood, and so on could be detected. His intellect was apparently unimpaired and he was well informed about current events. He seemed absolutely cured. However, this was not the whole story. A few months previously he had inherited some £7,000. This he had spent within the short period of four months, or if he had not spent it he had dissipated it. He thought that he may have been swindled of about £600, but the rest had vanished without a trace. Now what would be the position of an employer who employed such a man and who lost £7,000 from his business ? The patient would naturally plead he was irresponsible and no doubt be regarded as innocent, but the poor employer would be regarded as a fool for employing him. I advised my patient to learn a trade without much responsibility, such as that of a typewriter mechanic, and this I believe he has

done. I feel in view of this man's behaviour that it is unwise to trust similar patients with responsibility, no matter how normal they look.—I am, etc.,

London, W.1. CLIFFORD ALLEN.

Technique of Shock Therapy

SIR,—Treatment by E.C.T. imposes severe strain on the patient, and during fits bones may be fractured or even death result from heart failure. Hobson (*J. belge Neurol. Psychiat.*, 1947, **2**, 613) refers to 20 deaths in the literature attributed to E.C.T., and of these 16 were probably due to cardiac failure. Because of these risks many patients in poor physical condition are denied the treatment that their mental illness needs.

The combination of large doses of tubocurarine chloride and thiopentone is attended by the risks of shock and laryngeal spasm, and the procedure is time-consuming. So I have come to be content with the more easily managed degrees of muscular relaxation obtained by using 8 to 13 mg. tubocurarine chloride alone, the smaller of these doses sufficing for a slim and poorly nourished woman, and the larger for men of average stature and physique. In my experience one's personal assessment of the patient is an adequate guide to dosage; body weight should be taken into consideration, general health and physique, cardiovascular state, and the degree of nervous apprehension. After a time we substituted decamethonium iodide, using from 3 to 3.75 mg. in the case of men and slightly smaller doses for women; more recently still we have used "flaxedil." Immediately after giving the injection it is my custom to tell the patient it may cause a little difficulty in breathing but that this does not really matter and will be short-lived. We have found that three and a half minutes is long enough for the drug to take maximal or nearly maximal effect, and we allow this time to elapse before passing the electric current.

Since the introduction of this method none of our patients have been found to have sustained fractures. We take a number of routine precautions. Hyoscine 1/75 gr. or 1/100 gr. (0.9–0.65 mg.) is given beforehand to allay apprehension. Immediately after the fit we give O_2 and CO_2 for a few minutes until the colour is quite satisfactory. "Prostigmin" (the effect of which is to antagonize curare) is available for use where breathing is very shallow, and ampoules of "coramine" and adrenaline are kept ready in case of shock.

One other point of interest is the result of a small series of experiments on the intensive method of giving E.C.T. Twenty-six unselected patients had a single shock at each weekly session and 26 other patients were given a second shock a few minutes after the first at each session. So far as this series can be taken as evidence, the results indicated that no benefit is to be expected from a second passage of current shortly after the first.

I should like to express my indebtedness to Dr. Beresford Davies and Dr. A. Stephen, with whom I was associated in this work.

—I am, etc.,

Essex. D. T. MACLAY.

Radiation Cancer of the Pharynx

SIR,—Dr. A. W. G. Goolden (November 10, p. 1110) described four cases of radiation cancer of the laryngopharynx and mentioned that only four other cases had been reported in the literature. The following account of a similar case may therefore be of interest.

A woman of 54 years had received an intensive course of radiotherapy for thyrotoxicosis in 1933. She was admitted to hospital in June, 1950, when she complained of progressive dysphagia of six months' duration. The patient was pale and emaciated, weighing only 4 st. 12 lb. (31 kg.). A calcified nodule was palpable in the thyroid gland, and the overlying skin showed marked pigmentary and fibrotic changes due to the previous irradiation. There was an exophthalmos, but no evidence of thyrotoxicosis, the B.M.R. being normal. A barium swallow revealed almost complete obstruction of the entrance to the oesophagus, where a hard and fibrous growth was found at laryngoscopy. There was a stricture at least 1 in. (2.5 cm.) in length which could not be dilated. A biopsy taken from this area contained no malignant tissue. A radiotherapist considered that the condition was the result of previous radiation and that the gross skin changes would preclude any further radiotherapy should the stricture prove to be malignant.

The patient became very distressed and was able to take only small quantities of fluid. A gastrostomy was performed and feeds of milk with glucose, "casydrol," and cod-liver oil were administered at two-hourly intervals. She then improved slowly and was discharged in September, 1950. There was a dramatic and progressive improvement in her general condition during the ensuing seven months She gained more than 3½ st. in weight (returning to her normal weight of 8 st. 7 lb.—54 kg.) and was able to resume most of her household and social duties. The gastrostomy functioned well and caused little inconvenience. In April, 1951, she complained of hoarseness and excessive accumulation of saliva but felt well in other respects. In view of her good general condition, she was referred for pharyngo-laryngo-oesophagectomy, which was successfully performed in July, 1951, about 18 months after the onset of the symptoms. A biopsy taken from the anterior part of the stricture before operation showed a squamous carcinoma. The growth had infiltrated the right cricothyroid region, but there were no malignant deposits in the neighbouring glands and no evidence of more distant spread.

The history of this case suggests that a pharyngeal carcinoma arising in the fibrotic tissues of an irradiated area may remain relatively localized for a considerable time. Palliative measures, such as local dilatation of the stricture or further irradiation of the area, are likely to be impossible. In the present case a gastrostomy allowed the patient a year of useful and relatively comfortable existence and a radical surgical procedure was still possible at the end of this time. If, as Dr. Goolden suggests, more cases may be expected from the radiation era of 25 to 30 years ago, then gastrostomy should be considered whenever there is obstruction to the gullet in a previously irradiated patient. In some the malignant process may be of slow growth, and in others the obstruction may prove to be benign. The patient should not therefore be denied a gastrostomy, as often happens in cases of post-cricoid carcinoma, on the grounds that it will merely prolong the agony. Dr. Goolden's four cases were all diagnosed more than a year ago. It would be interesting to hear of their subsequent fate.—I am, etc.,

Liverpool. C. M. OGILVIE.

Early Diagnosis of Cancer

SIR,—I was interested to read the letter of Dr. R. Lester Black (December 1, p. 1338) and I was wondering why a useful aid for this purpose is not more generally employed in this country. I refer to the smear technique developed principally by Papanicolaou, whereby any of the body fluids such as urine, female genital-tract secretions, sputum, exudates, etc., are examined for the presence of malignant cells. Though the method is not 100% certain it is nevertheless a very useful aid, particularly as it is possible to pick up cancer at a very early stage. In the three cases quoted by Dr. Black there is a reasonable chance that an early diagnosis might have been made by the method, and this in its turn would have led to further investigation and finally to surgical intervention at a stage when a reasonable hope of a cure could be expected.

The technique is widely employed in the Americas and to some extent on the Continent, but in this country, as far as I can make out, it is only applied in a few hospitals to a very limited extent and that mostly to the female genital tract and to a lesser extent to sputum. I personally am trying it out with some success on the routine examination of urine for the diagnosis of tumours of the bladder.

Some people in this country have expressed grave doubts about the effectiveness of the method, as so much depends on the correct interpretation of the smears, but, provided this is done by persons fully experienced in the method, and provided it is used only as an aid to diagnosis and not as a final

diagnostic procedure, a positive smear always being confirmed by some other method, I cannot see why it should not become a further valuable weapon in the armamentarium against this dread disease.—I am, etc.,

Birmingham. J. G. S. CRABBE.

Diabetic Gangrene

SIR,—I was greatly interested in the article by Dr. A. Grunberg, Mr. H. L. Davies, and Dr. J. L. Blair (November 24, p. 1254) and treatment by conservative surgery. Amputation for gangrene, except in special circumstances, always seemed to be a drastic and uncertain remedy, and many patients simply would not survive. Gangrene is always due to defective circulation, from one cause or another, and the defect is not necessarily confined to the immediately affected tissues.

For 25 years I was medical officer in charge of approximately 200 old people, men and women. Dry senile gangrene was very common among the male inhabitants and always led to a fatal termination. No definite history of acute alcoholism could be obtained, but all admitted that they "took a drop of beer" in their youth. Surgical interference did not appeal to them or to me, for obvious reasons.

For the last seven years of my sojourn I prescribed, at the first sign of localized defective circulation, 50 mg. pethidine once or twice daily for an indefinite period without any signs of constitutional disturbance. The general result was definitely favourable and led to an alleviation of the pain, which was often very considerable, and to an improvement in the localized circulation. The improvement was steadily maintained and no further deaths occurred. Since the N.H.S. came into force I relinquished the medical care of these poor old people, so have no further experience to relate.

It might, however, be worth while for those with opportunities to give this simple remedy a prolonged trial.—I am, etc.,

Birkenhead. D. J. GAIR JOHNSTON.

Plain Facts and Enlightening Words

SIR,—Dr. A. K. Daniels's "Plea for Enlightenment" (October 20, p. 976) touches such a sore and difficult problem that it seems worth amplifying and following up, in view of the great importance of the *British Medical Journal* to all medical men, however widely different their main spheres of interest.

It may be impossible to explain vast subjects like atomic physics to the entirely uninitiated in anything like two pages, but often one or two lines in the text (or a footnote) or five to ten lines in the introduction of a paper, giving an outline of the problem and experimental technique, may make all the difference to the non-specialist but interested reader with a reasonable general knowledge of the subject. Even the more initiated reader, however, may require fuller data than many papers contain if he is to be enabled to follow critically the argument of an article presenting original research.

Confining myself to part of the very number in which A. K. Daniels's letter appeared, the following examples may make my case clearer.

In the article on "Spread of Influenza" (p. 921), even a reader who has done quite a bit of bacteriological and serological work may well not know what FMI (1947) strain is (p. 923), and, without expecting full technical details of the methods used, would welcome a few words of explanation of the general principles and of the significance of the figures in the tables. One may guess that they might be inhibition titres—but titres in which sense? And from what limit do they have significance? Also, what is a "subtype of A prime"? Further examples could be given, but it may be clear what I wish to convey—i.e., that things which may be perfectly obvious to somebody actively engaged in specialized research of a similar nature may be meaningless to the vast majority of *interested* readers, who would be perfectly satisfied by a short explanation which may make all the difference to the "many" without seriously holding up "the few."

Another example on a slightly different level. On p. 947, in "Uric-acid Levels in Blood and Plasma," an explanation seems very desirable concerning the nature of the figures following the ± sign in Table I. After reading the first line, one may feel inclined to assume that 0.93 is the standard deviation, as the standard error calculated under this assumption for a series of 114 observations has the value given in this line for the standard error. This does not, however, apply by any means to the second line, as here the same calculation leads to a result for the standard error entirely different from the value given in this line as the standard error of this series. It is only after considerable puzzling that one feels inclined to think that, strangely enough, the authors may have taken in the second line the value of square root 114 to be 16.0, while it was correctly used as 10.68 in the first line. Had it been clearly stated what the figure after the ± sign is, the matter would have been much simpler.

It was, furthermore, felt that the expression "Significance ratio" in the same table should have been clearly defined. I was unable to see how the figure 3.8 after the term "significance ratio" was obtained, and, therefore, what it meant, even allowing for the calculation error surmised in the preceding paragraph.

As the term "significance ratio" is unfamiliar to me, I wrote to a well-known professional statistician and asked him whether I was justified in taking exception to this lack of definition or whether my scanty statistical knowledge was to blame. I quote from the reply: "Significance ratio is not a generally accepted term . . in the present case it is presumably intended to represent mean difference/standard error. . . . I cannot see how the authors have obtained their significance ratio of 3.8. Your own value of 3.06 is correct if one assumes that the two means are uncorrelated and that the corresponding population variances are equal."

The figure of 3.06 which I had calculated and submitted to the expert was the value of "t" in the well-known Student's t-test, considering the data as constituting a group comparison.

"It might be, however," continues the expert, "that the figure of 3.8 was arrived at by considering the data as constituting a *paired* comparison. Since the blood and the plasma values are probably correlated to an appreciable extent, the test certainly ought to have been carried out in this way; but the paper leaves one in doubt as to whether in fact this was done."

Had the paper given a clear definition of the terms employed it would be much easier and less time-consuming for the reader to assess the value and significance of the data published and if appropriate, to put forward constructive criticism or to find the basis for further experimentation. This is my general point, which seems to me to be much more important than the clarification whether in this individual paper one or more weird arithmetical errors have occurred (don't they occur easily!).

It is quite realized that the editor's task of striking the right balance between excessive length and excessive conciseness is particularly difficult in a journal of the character of the *British Medical Journal*. Perhaps some general rules might be incorporated in a leaflet of advice to writers in the *British Medical Journal*, similar to those printed in nearly every issue of certain periodicals—in this case, however, perhaps with particular consideration of the problems arising from the special qualities of the *British Medical Journal* and its subscribers.—I am, etc.,

Aylesbury, Bucks. W. STROSS.

SIR,—If my letter (November 3, p. 1088) conveyed the impression that I was opposed to the statistical approach in the evaluation of forms of treatment, I am in error. What I wished to convey was, first, an appeal for the simplification of the mathematical exposition, and, secondly, the danger, as I conceive it, of the so-called scientific approach becoming a Frankenstein's monster, our master instead of our servant: with the first of these aims your leading article (November 3, p. 1074) is, I think, in general agreement. There exists an increasing tendency to neglect forms of treatment which, however empiric, have proved of some value, when a treatment statistically shown to be the most effective has failed in the individual patient.

You contest my thesis that "no statistics can cater for the psychological element in the treatment of disease." I would agree that statistical clinical trial can afford valuable information, provided strictly analogous groups are employed: but the factor of mass emotion or mob psychology cannot be reduced to a mathematical formula; as a simple example the atmosphere (and the statistics of recovery) in a rehabilitation class can be completely wrecked by the introduction of two disgruntled individuals. Your reference to the method of trial of deoxycortone and ascorbic acid seems to me to beg the question. How, in fact, did saline injections "ease the pain and add to the strength of the patient?" Unless

you attribute a specific effect to saline in the treatment of rheumatoid arthritis, the improvement can be due only to some psychological factor, possibly the fact that the patients had gained renewed hope, since something active was being done for them: but is this factor measurable by any yardstick, or amenable to group comparison? A number of years ago I attempted to make an assessment of the efficacy of gold therapy in some 300 patients suffering from rheumatoid arthritis, and I arrived at the conclusion that 70% were materially improved; but about that time a paper, I think Danish in origin, was brought to my notice in which an account was given of an equivalent number of patients of whom half were treated with gold and half with injections of saline: 70% of the gold-treated cases reached my standard of improvement, but 48% of the saline cases did also. What conclusions can one draw from these figures? That parenteral injection will produce 48% improvement, and that gold will add a further 22%? Certainly not: the very word "gold" may have an inherent mystical aura which may enhance or debase its virtue. There are no spiritual values in mathematics, and faith and hope are not reducible to formulae.

Another aspect of immediate importance is the impossibility, in our present state of knowledge, of assessing the interaction between the psychological make-up and the secretory systems, endocrine or exogenous. Selye's "failure of the adaptation syndrome" theory may suggest the mechanism whereby the emotions may influence the endocrines, or vice versa, but not, unless you accept a purely mechanistic theory of existence, an explanation of the origin of feelings: behaviourism as the modern concept of philosophy has surely declined.

I would like to thank a number of correspondents who have kindly sent me data on which to found further argument.—I am, etc.,

Sunderland. W. GRANT WAUGH.

SIR,—The correspondence started by Mr. W. Grant Waugh's letter (November 3, p. 1088) prompts me to call to mind the fact that medicine is generally considered to be one of the learned professions. Your correspondents may read Homer in the Greek for all I know, but some of them clearly feel that elementary mathematics is no pursuit for a learned man. Dr. Andrew S. Barr (November 17, p. 1218), who considers it a waste of time to introduce medical students to the elementary principles of statistics, asks what use a certain standard statistical formula is in the treatment of post-partum haemorrhage. The only answer is, of course: No direct use in the emergency. But when he proceeds to complete the treatment of his patient by the transfusion of blood he is (unwittingly no doubt) making use of the labours of a band of men who have been compelled to resort to statistical algebra to find their way through the maze of blood groups. The formula that is complained of happens to be part of an attempt to turn a medical student into a member of a learned profession by giving him an outline of the processes of thought which lead to advance in the science of medicine. In the absence of some kind of scientific training the practitioner could only be a mere journeyman. Dr. Barr dimly subscribes to the view, for he would have his medical student taught the fundamentals of physiology, but even in this subject, particularly in that neglected part called pharmacology, the student will be inevitably called upon at least to have some idea of statistics.

It is curious that statistics raise so much vulgar prejudice among doctors, particularly of late years. I fear too many of them are the kind of people once described by a celebrated minister of religion as "people who would have objected to the Creation if they had been present, on the grounds that it was something they had not seen before." After all, the first time a statement was made by a doctor that one form of treatment cured more patients than another, that statement was a statistical one. What gets your correspondents' goat is, however, the fact that the statistics applicable to small samples happen to be a little more algebraic in form; but the justification for the use of modern theory is the immense increase in and certainty of the information extractable from the data. Of course statistical theory may be badly applied and graphs may be badly presented, but that is no reason for the torrents of abuse heaped on their proper use. I would suggest to you, Sir, that you have given far too much space to the expression of these prejudices against a well-established and valuable method of arriving at objective analysis of data.—I am, etc.,

Beckenham, Kent. J. TREVAN.

POINTS FROM LETTERS

Plain Words

Dr. ANTHONY ALMENT (London, E.1) writes: I share with Sir Adolphe Abrahams (November 10, p. 1153) suspicion of the campaign to reduce the language of our profession to simpler terms. But when he contends that we employ too restricted a style and paucity of adjectives does he not overlook that it is the essence of the teaching of students primarily to encourage keen observation and to deny the loophole provided by the qualifying adverb? The student needs no licence to employ the finer shades of description; he must learn to decide, Is it or is it not enlarged? When his mind is constantly upon the bargaining ordeal of the viva voce it is natural that he should demand of his teacher first the hard ringing coin of certainties. It is indeed the dilemma of medical training that such currency is, in reality, of only comparative value. . . . Finally, may I use this forum to make a plea for the rejection of the stilted phrases, "Made a vaginal examination," and, "Did a p.v."? An expression used in the eighteenth century by William Smellie well merits revival for its simplicity and suggestion of delicacy of the manœuvre: "I touched her."

Dr. G. WHITWELL (Chester) writes: I want to support Dr. R. Good (November 24, p. 1278) in his contention that language cannot be tied even by the grammarian or Fowler's *Modern Usage*. It must grow, but nevertheless there are errors in language in which the grammarian can certainly advise without hindering this natural growth. These errors are usually those of clarity and taste. Fowler's book did service in both these directions. It rightly thumped Elegant Variation, which is a curse that often appears in medical literature. It is a curse because it bores and fatigues the reader. Here, for instance, is a nasty example of it from a recent article by an obstetrician. "The technique of, and indications for, blood transfusion *became standardized*, rhesus blood incompatibility *became manifest*, knowledge of haemorrhage *became clarified*, and the place of chemotherapy and the use of the antibiotics in the various infective processes *became established*." I do not know why this writer stops here when he still had "became routine" and "became everyday practice," and no doubt other "becames." This misuse of words shows that this writer has no feeling for his tools. He is using them to save himself thought, and using them to stuff with rubble the weakness of his structures. This Elegant Variation commonly occurs in purplish passages and disappears in factual writing. It involves more words than are necessary, and seems to occur in those writers that think it necessary to put on a ceremonial sort of address when they take up the pen.

Cold Light Test for Blood

Dr. R. E. REWELL (Liverpool) writes: The recent correspondence (November 3, p. 1092; November 24, p. 1280) on the cold light test for the tracing of blood seems to be an excellent illustration of the ephemeral nature of communications and letters in even such a journal as yours. My first contact with the test was in an article by J. McGraith (1942, **2**, 156), who suggested it as a medico-legal test for blood. However, as pointed out by S. R. Naidu and N. Pitchandi (1943, **1**, 563), from India, the test is given by other substances such as copper salts, while J. L. Hoskins and myself (1943, **1**, 709) pointed out further that it was produced by many common oxidizing agents such as potassium permanganate, but that it was still of great use in the detection of occult blood in faeces where contamination with such substances was unlikely to occur. There is a great saving in reagents such as ether, and I have used it for some time for this purpose. One of your recent correspondents (November 3) says that the test fades on exposure to light, but I do not think this is quite correct, as it inevitably fades after a short time, only to be brought up again on the addition of more of the oxidizing agent. The light produced can be greatly prolonged in this way, and is an excellent trick to show at children's parties.

Obituary

SIR PETER BUCK, K.C.M.G., D.S.O., M.D., D.Sc.

Sir Peter Buck, director of the Bishop Museum at Honolulu and emeritus professor of anthropology at Yale University, died in Honolulu on December 1, aged 71.

Peter Henry Buck was born in New Zealand, the son of an Irish father and of a Maori mother, a chieftainess. His mother died when he was a child, and he was brought up by his grandmother, who lived to be 102 years old and was according to his own story "more tattooed than any woman I have ever seen or heard of among my people." After leaving Aute College he studied medicine at Otago Medical School. A keen athlete, he became the champion long-jumper of New Zealand. After graduating he became house-surgeon at Dunedin Hospital and then was made medical officer of health to the Maoris in 1905. In 1909 he entered the New Zealand Parliament and became the representative of the Maoris in the Cabinet. During the first world war he served in Egypt, Malta, Gallipoli, and France with the New Zealand Expeditionary Force, being awarded the D.S.O. in 1917 and twice mentioned in dispatches.

On returning to New Zealand after the war he was appointed director of Maori Hygiene in the Department of Health. From then on his renown as an expert on Polynesian culture began to grow, and he eventually gave up medicine altogether when he accepted a post as an ethnologist on the staff of the Bishop Museum in Honolulu in 1927. He made many expeditions into the South Pacific and his writings brought him international fame. One of his well-known books is *Vikings of the Sunrise*, and his last work, *The Coming of the Maori*, is soon to be published.

Honours and academic distinctions came to him from all over the world. He was visiting professor of anthropology at Yale University from 1932–4 and in later years, an M.A. of Yale, a doctor of science of the Universities of New Zealand and Rochester, a doctor of literature of the University of Hawaii, and a recipient of the Rivers Memorial Medal of the Royal Anthropological Institute and of the Royal Order of the North Star of Sweden. He was created K.C.M.G. in 1946. Three years ago he helped the U.S. Navy to settle the former residents of Bikini atoll on the island of Rogerik. Sir Peter Buck's death will leave a large gap in the ranks of those who have closely at heart the peoples of the South Seas.

N. S. CARMICHAEL, F.R.C.P.Ed.

By the death at Edinburgh of Dr. Norman Scott Carmichael the city has lost not only one of its worthy physicians but a beloved and much respected personality.

"Norrie," as he was best known amongst his friends, came from a well-known Edinburgh family. Born in 1883, he was the son of Dr. James Carmichael, physician to the Royal Hospital for Sick Children. After leaving the Edinburgh Academy he went on to the University of Edinburgh, where he graduated in 1905. Then followed resident house appointments in most of the Edinburgh teaching hospitals. During this early period of his career he was a president of the Royal Medical Society. Carmichael then followed in his father's footsteps, and built up an extensive family practice, at the same time continuing his interests in specialized medicine. In 1910 he was admitted to the Membership of the Royal College of Physicians of Edinburgh, and in 1913 was elected to its Fellowship. He was now on the honorary medical staff of the Edinburgh Royal Hospital for Sick Children, but his career was interrupted in 1916 by the world war, and he served in the R.A.M.C. until 1919. In recognition of his work in Salonika in 1917 he was honoured by the Serbian decoration of Membership of the Order of St. Sava.

After demobilization he returned to Edinburgh, where for many years he was physician at the Royal Hospital for Sick Children, and lecturer in Diseases of Children. He was a perfect chief, with outstanding clinical ability and common sense, and a most popular teacher. His presence gave a very delightful and happy atmosphere within his unit. He never appeared to be angry, was always helpful to his juniors, and dispensed his well-balanced and sound advice readily and in a most acceptable manner. His quiet mien and charming personality made him one of the most popular figures in Edinburgh. In 1923 he was admitted a member of the King's Bodyguard for Scotland (Royal Company of Archers), and later was appointed Surgeon-Apothecary to the Household at the Palace of Holyrood House.

After ending his term of service as honorary physician to the Children's Hospital he was appointed honorary consulting physician. In the same year he was appointed honorary physician to Chalmers Hospital. At the outbreak of the second world war he once more gave his services in the emergency and was superintendent and consulting physician to the E.M.S. Hospital in South Ayrshire and, later, medical superintendent to Leith Hospital. During the past few years, although suffering from severe physical disabilities, he persevered in carrying on his work with that indomitable spirit which was so characteristic of the man.—D. N. N.

CLEMENT A. FRANCIS, M.B.

R. S. S. writes: The untimely death of Mr. Clement Francis (recorded in last week's *Journal*) came as a great shock to his colleagues and is a serious loss to the Metropolitan Ear, Nose and Throat Hospital, of which he had been for long one of the pillars. He spent most of his life, after qualifying, in its service, and was in turn house-surgeon, clinical assistant, assistant surgeon, and surgeon to the hospital, and was for many years honorary secretary of its medical committee and a member of its committee of management. He was a careful, conscientious, and conservative surgeon, but his chief interests—and all of his writings—were in allergic diseases, on which he was an acknowledged international authority. His allergy clinic was much the largest out-patient clinic at his hospital, and was frequented by many postgraduates; his private practice was equally extensive, for he brought relief in this troublesome group of diseases to innumerable grateful patients from far and wide, mainly by his father's method of lightly cauterizing the nasal septum, though his mind was always open on the subject of allergy and his knowledge of it was encyclopaedic. He had an uncommonly generous and kindly nature and still possessed a boyish zest for games—he was an excellent golfer and only last summer at Frinton made top score at a cricket match. Clement Francis will be greatly missed by his many friends in widely differing circles in and out of the medical profession.

Dr. HENRY DAVID KELF, who spent most of his professional life in the public health service, died at Parkstone on October 25, aged 76. After studying medicine at St. Bartholomew's Hospital, he qualified in 1919 and took the D.P.H.(Camb.) in 1923. He went into private practice in Greenwich after a short period of service as assistant medical officer of health to the Hampshire County Council. Later he became medical officer of health for the Kingsclere and Whitchurch Rural District and the municipal borough of Basingstoke. He retired after 20 years' service in that post, but returned to public health work during the war as assistant medical officer of health at Poole. He later became deputy medical officer of health of Poole for a short time, and finally retired in 1946. Dr. Kelf was honorary secretary of the Southern Branch of the Society of Medical Officers of Health during 1926–32 and president in 1934. He also served the Aldershot and Basingstoke Division of the B.M.A. as honorary secretary from 1937 to 1940. He was a most thorough and conscientious member of the public health service, and was popular with all who knew him. A keen philatelist, he exhibited rare stamps from his collection in many parts of the country. He had also travelled extensively and had a wide circle of friends throughout Europe.

By the death on November 6 of ROBERT DURWARD CLARKSON, former superintendent of the Royal Scottish National Institution for the Mentally Defective, at Larbert, Scotland has lost a distinguished physician and psychiatrist. A scholarly man and one of outstanding ability, he had a distinguished career at Edinburgh University, graduating B.Sc. in 1886 at the age of 19, M.B., C.M. four years later, proceeding M.D. in 1906, and receiving his Fellowship of the Royal College of Physicians of Edinburgh in 1910. After various hospital posts he entered general practice in Falkirk, where he was appointed visiting medical officer to the Royal Scottish National Institution in 1895. In 1911 he became resident medical superintendent, a post which he occupied till he retired in 1935. His thoughts and interests were early turned to mental deficiency when, as a boy holidaying in the country, he found the defective son of a farmer tied up in the byre for his own safety. His talks with the boy and the sympathy aroused made a deep impression on him, an impression which remained with him all his life. His work in general practice stood him in good stead when he took up mental deficiency as his specialty, for he brought to it not only a wealth of clinical experience and scientific knowledge but also a profound understanding of the social background from which his patients came. His knowledge of mental deficiency and his understanding of the defective were in advance of his times. He always maintained, contrary to the then popular view, that the well-educated, understood, and stabilized defective could become socially efficient. At the time when he took up his specialty the I.Q. was unknown, yet Dr. Clarkson could diagnose and assess with a skill and accuracy unsurpassed to-day. He became one of the foremost authorities on his subject and was everywhere recognized as such. He put his views into practice in the institution and soon established a special school, workshops, and training facilities. His great desire was to have a separate colony for adults, and this was achieved in 1934. The colony, situated in beautiful surroundings, now stands a worthy memorial to his foresight and vision. He was one of the founder members of the Scottish Association for Mental Health, which he represented at the second International Congress in Paris in 1936. He went to live in Perthshire after his retirement, but remained consultant to the institution and to the Stirling Infirmary, and he also served on various medical boards. A man of great charm and outstanding ability, he was of a retiring disposition and simple tastes, and throughout his life maintained an open mind, always ready to pay attention to the views of others. He sought neither publicity nor position, but merely to serve others. A man of deep religious convictions, he stressed the great importance of religion in the field of mental health and of bringing the Churches into the movement. By his love, sympathy, and understanding he brought happiness and a new hope to the lives of so many. This was very evident by the number of his old patients who later visited him, some to seek further advice and guidance, and all to thank him. Those who had the privilege of knowing him and of working with him feel that he has left a great trust to those carrying on his work. —K. F.

Dr. GRACE DOROTHY CHAMBERS died after an illness of six months at her home in Putney on November 25. She had been in general practice in Putney for over 25 years. Her intention had been to take up teaching as a career, and from Croydon High School she went on to the Royal Holloway College, where she took an honours degree in mathematics. However, she then decided to change to medicine, and studied at the London School of Medicine for Women and at St. Mary's Hospital, qualifying in 1922. After being house-physician to Professor Langmead she graduated M.B., B.S. in 1924, and finally proceeded M.D. in 1927. In February, 1925, in conjunction with Dr. Dorothy M. Stewart, she founded a highly successful practice in Putney, which she continued until her last illness. Her dynamic personality was combined with an unusual degree of insight into the problems of her patients, so that her advice became sought equally by men and women of all ages. In spite of her wonderful organizing capacity, the practice grew so rapidly that before long it necessitated a partnership of four women—forming one of the largest medical practices run entirely by women in the London area. Over the years she remained the senior partner of the firm, and throughout those in practice with her appreciated her leadership and example. Although she deplored the changing face of medicine, brought about by the National Health Service Act, she did her best to fulfil her obligations to all her patients: at the same time she became a member of the London Local Medical Committee. For many years she was a staunch supporter of the Wandsworth Division of the British Medical Association, and had been a member of its executive committee. Since 1930 she had been a member of the board of management and of the medical committee of Putney Hospital and also medical officer of the Fulham and Putney Division of the British Red Cross Society. Last year she was elected president of the Putney Medical Society. No better expression of the esteem and love of her patients can be found than in the hundreds of letters which have been received. These show not only the admiration and sense of loss which are so widespread, but also the extraordinary generosity which she had extended to so many over the years, and which has only just come to light.—H. McQ.

Medical Notes in Parliament

Miners' Emphysema

Dr. BARNET STROSS asked on November 27 what research had been made on the problem of miners' emphysema, and whether the condition could be classed as an occupational disease. Mr. A. H. E. MOLSON replied that work on industrial pulmonary diseases, including those associated with coal-mining, formed a substantial part of the research being carried out by the Medical Research Council; emphysema could occur in association with pneumoconiosis, but there was no evidence that it was in itself an occupational disease specific to mining. Dr. Stross further asked whether the work done in Cardiff by the pneumoconiosis research unit was to be published, and when the report could be expected. He was told that the results were published as they became available in scientific journals; over 20 papers had so far been published, and were listed in the M.R.C.'s reports to Parliament. In addition *Social Consequences of Pneumoconiosis among Coal Miners in South Wales* had been sponsored by the Council, and was available from H.M.S.O. (See *Journal*, July 7, p. 54.)

Makerere College

Mr. C. J. M. ALPORT asked the Secretary of State for the Colonies on November 28 whether he intended to make any grant towards the replacement of equipment destroyed in the recent explosion and fire (*Journal*, November 17, p. 1229). Mr. A. T. LENNOX-BOYD told him that the matter was being examined, but it would not be possible to reach any decision until the full extent of the damage was ascertained.

On December 5 Mr. JOHN RANKIN asked how many Indian students were attending the college and what fees they paid. Mr. LENNOX-BOYD replied that full information was not yet available and he was making inquiries. Mr. Rankin further asked whether the Minister was aware that the college was intended to be an inter-racial college and that it was alleged that Indian students were being charged £500 per year each and as a result only three Indian students were now in attendance. He asked what steps were being taken to stop this racial discrimination. The Minister answered that it was hoped that Makerere would in time become an inter-racial college, but pointed out that its main purpose was to cater for Africans.

Speaking in the debate on higher African education on December 7 Mr. JAMES JOHNSON stated that there were now thirty men and a woman student in the medical faculty of the college. He maintained that the standard was not high enough and Africans who gained degrees were not recognized by universities in this country. We were only turning out what might be termed African medical assistants. Mr. C. J. ALPORT said it was all very well to demand that when degrees were given they should be recognized by our own medical authorities, but Parliament must be certain that enough time elapsed to allow for teaching to develop in these schools. He was sure that the House would welcome the development of the Institute of Medical Research at Makerere.

Pneumoconiosis and Byssinosis Bill

The EARL OF SELKIRK, in the House of Lords on November 29, moved the second reading of the Pneumoconiosis and Byssinosis Benefit Bill, which had already passed the House of Commons. In expounding its proposals he said it was fundamental that the Bill, if it was to pass at present, should not extend to the partially disabled. The Government was afraid that otherwise the medical panel would be completely overburdened. The Government had undertaken to investigate this problem with the T.U.C. and would introduce a measure as soon as possible to cover this point. The Pneumoconiosis Research Unit at Cardiff and Government departments were doing all they could, and he hoped that an end would be put to the evil brought about by this disease. After a short debate the Bill was read a second time without a division.

Private Donations to Hospitals

Mr. H. CHANNON on November 29 asked the Minister of Health whether nationalized hospitals were still entitled to accept private donations towards their Christmas and other special funds. Mr. H. F. C. CROOKSHANK replied that they were, under Section 59 of the National Health Service Act, 1946.

Tuberculous Patients in Switzerland

Answering a question from Mr. G. WILLIAMS on November 29, the MINISTER OF HEALTH told the House that 138 patients from England and Wales had gone to Switzerland for treatment under the Health Service. No more patients would go until the time came to replace those there now, as the full number of beds contracted for were occupied.

Money for Cancer Research

Mr. A. D. DODDS-PARKER on December 6 inquired how much the Ministry of Health proposed to spend on the work of cancer research during the year 1952.

Mr. H. F. C. CROOKSHANK replied that expenditure on cancer research borne by his department was mainly included within the total expenditure on treatment of cancer, for which separate figures were not available.

Cost of Transporting Oxygen

Mr. GEOFFREY WILSON on December 6 asked the Minister of Health to amend his regulations so as to allow payments from the National Health Service funds towards the cost of conveying oxygen from a pharmacy to a patient's home when required by a general practitioner in an emergency.

Mr. H. F. C. CROOKSHANK refused, declaring that he would not feel justified in present circumstances in accepting this additional charge on public funds.

G.P. Remuneration

Mr. A. BLENKINSOP on December 6 asked for a statement on the progress of negotiations with the British Medical Association on the subject of general-practitioner remuneration. Mr. J. E. MACCOLL, putting a similar inquiry, suggested that the evidence placed before the adjudicator should be made public so that Parliament could be fully informed of the reasons for any subsequent recommendations.

Answering both questions, Mr. H. F. C. CROOKSHANK was glad to report that Mr. Justice Danckwerts had accepted an invitation from the Lord Chancellor to act as adjudicator. It would be for him to determine, with the parties to the adjudication, whether the evidence should be made public.

Mr. HUGH LINSTEAD asked on December 4 what representations the Minister of Labour had received from the British Medical Association regarding the need to establish separate and appropriate arbitration machinery for the settlement of disputes over remuneration or other conditions of service.

Sir PETER BENNETT replied that Sir Walter Monckton had received representations from the Association pointing out that they were not a trade union and were therefore precluded from reporting disputes to him under the Industrial Disputes Order. He was in consultation with the Minister of Health on this matter.

Scottish S.H.M.O.s

Lord MALCOLM DOUGLAS-HAMILTON asked on December 4 when the personal status of the senior hospital medical officer grade in Scotland would be reviewed.

Mr. J. STUART replied that his department was discussing with the medical profession in Scotland whether the present structure of the specialist service should be modified. For this reason no separate review of the grading of individual senior hospital medical officers was contemplated meanwhile. Such officers were free to apply for any vacant consultant posts that were advertised.

Lord MALCOLM DOUGLAS-HAMILTON pointed out that in England the Ministry of Health had issued instructions in July to boards of governors and regional hospital boards reviewing the status of officers. He asked whether the Department of Health for Scotland would similarly instruct Scottish regional hospital boards.

Mr. STUART said he had better await the report of the medical authorities on this subject.

Hypnotism

Mr. J. STUART told Dr. BARNET STROSS on December 4 that a girl hypnotized at a public entertainment in Airdrie Town Hall had been in hospital since November 12. He had no power to prohibit this type of performance, but hoped the case would warn parents and the public of the dangers of hypnotism. It would probably present difficulties to define hypnotism legally in any Act, but he would be glad to consult the Home Secretary to see if something could be done jointly for Great Britain.

Haemorrhagic Fever in Korea

Asked by Mr. J. RANKIN on November 27 to what extent the outbreak of epidemic haemorrhagic fever affected British soldiers in Korea, Mr. J. R. H. HUTCHISON replied that no British troops in Korea had been reported to be affected by any new disease such as that mentioned in recent press reports. Following the reports, information about the disease had been called for.

Medico-Legal

DEATH FROM CANTHARIDES

[FROM OUR MEDICO-LEGAL CORRESPONDENT]

On August 30, 1951, Charles Donnelly, aged 46, a waiter by profession, took 1½ gr. (0.1 g.) of "Spanish Fly," which had been given to him by a friend, in order to facilitate relations with his wife. When she came home in the evening he complained of pain and vomited, and his doctor, who was called in, found him vomiting and in abdominal pain. Next morning he was semi-comatose and was admitted to hospital. His tongue was covered with fur, and he had a festering ulcer of the soft palate, a very tender abdomen, and failure of the peripheral circulation. A provisional diagnosis of cantharides poisoning was made and he was treated with nikethamide. He died the same evening.

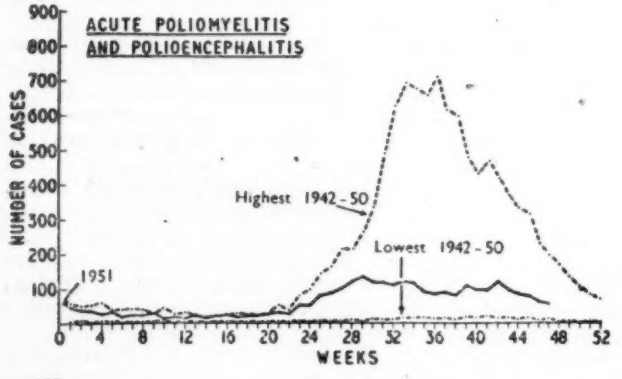
At necropsy several small blisters were found beneath the point of the chin. There was much sloughing of the mucosa of the lips, the anterior half of the tongue, and the palate, with surrounding hyperaemia in the two last situations. The contents of the stomach gave no definite evidence of the presence of cantharides, but extract of one kidney showed some evidence of it in that it was irritant to the skin and caused slight blistering. Dr. J. H. Ryffel, the Home Office analyst, concluded that sufficient time had elapsed before death for most of the active principle to be eliminated by vomiting and excretion.

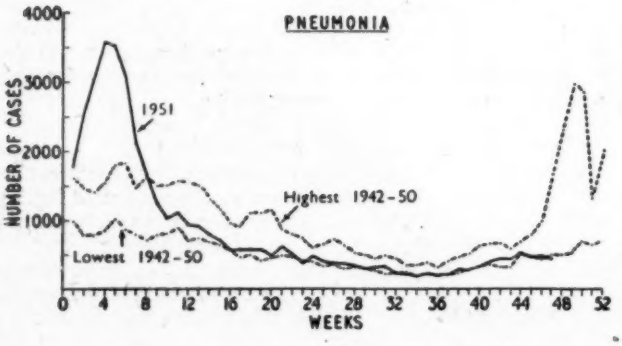
The cause of death was recorded as uraemia following cantharides poisoning.

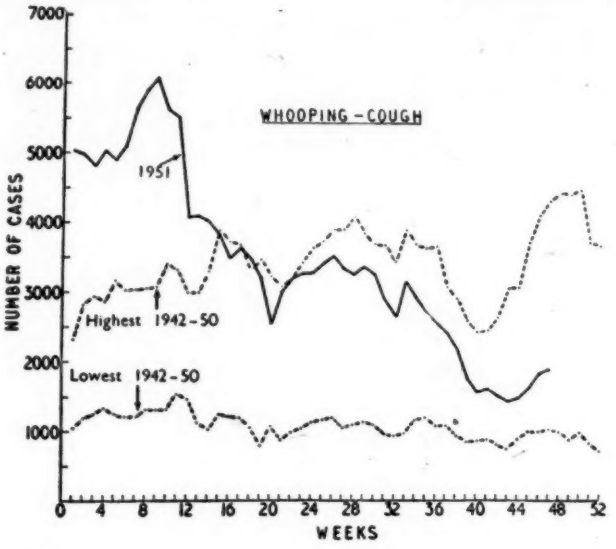
Vital Statistics

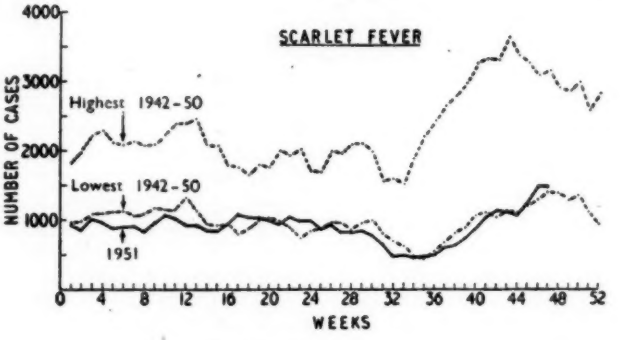
Graphs of Infectious Diseases

The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported during the nine years 1942–50 are shown thus -------, the figures for 1951 thus ———. Except for the curves showing notifications in 1951, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.









Infectious Diseases

The number of notifications of infectious diseases in England and Wales during the week ending November 24 was very similar to that of the preceding week. The largest variations in the individual causes were an increase of 58 for whooping-cough and a decrease of 37 for measles and for acute pneumonia.

The incidence of scarlet fever increased slightly in the southern counties and in the northern counties and decreased in the remainder of the country; the total notifications were 3 more than in the preceding week. The largest variations in the local trends of whooping-cough were a decrease of 56 in the number of notifications in Yorkshire West Riding and an increase of 35 in Bedfordshire. The notifications of diphtheria were 9 fewer than in the previous week, mainly because of a decrease of 10 in Staffordshire. The chief feature of the returns for measles was a fall of 31 in the number of notifications in Lincolnshire.

Notifications of both paralytic and non-paralytic cases of acute poliomyelitis were four fewer than in the preceding week. The largest returns were Yorkshire West Riding 9 (Leeds C.B. 3, Sheffield C.B. 3), Lancashire 5, Essex 5, and London 4.

There were 19 fewer notifications of dysentery than in the previous week. New outbreaks were reported during the week from Berkshire, Cookham R.D. 33, and Norfolk, Norwich C.B. 25. The other large returns of dysentery were London 45 (Fulham 11), Middlesex 22, Lancashire 18, Leicestershire 12 (Leicester C.B. 12), and Yorkshire West Riding 11.

A case of typhus (imported) was notified from Plymouth.

Week Ending December 1

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,585, whooping-cough 1,852, diphtheria 45, measles 2,313, acute pneumonia 432, acute poliomyelitis 56, dysentery 327, paratyphoid fever 18, and typhoid fever 2.

INFECTIOUS DISEASES AND VITAL STATISTICS

Summary for British Isles for week ending **November 24** (No. 47) and corresponding week, 1950.

Figures of *cases* are for the countries shown and London administrative county. Figures of *deaths* and *births* are for the 126 great towns in England and Wales (London included), London administrative county, the 16 principal towns in Scotland, the 10 principal towns in Northern Ireland, and the 13 principal towns in Eire.

A blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, N. Ireland, and Eire, the Ministry of Health and Local Government of N. Ireland, and the Department of Health of Eire.

CASES in Countries and London	1951					1950				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria	29	2	14	0	2	61	10	25	1	9
Dysentery	221	45	45	6		626	28	164	6	2
Encephalitis, acute	4	0	0	1		5	0	0	0	
Enteric fever:										
Typhoid	5	0	0	0	2	3	0	1	1	1
Paratyphoid	14	0	6 (B)	0		7	2	0	0	
Food-poisoning	104	25		1		151	25		2	
Infective enteritis or diarrhoea under 2 years				20	13				30	32
Measles*	2,047	22	120	143	69	11,343	827	191	142	164
Meningococcal infection	46	4	12	2	4	37	5	16	2	3
Ophthalmia neonatorum	32	2	11	0		45	5	9	0	
Pneumonia†	430	33	199	6		490	33	206	15	
Poliomyelitis, acute:										
Paralytic	41	2	7	2	3	130	4	10	0	5
Non-paralytic	16	2								
Puerperal fever§	243	20	20	0	1	48	4	15	0	
Scarlet fever	1,476	120	335	43	50	1,483	101	198	63	75
Tuberculosis:										
Respiratory			141	30				133	29	
Non-respiratory			31	6				22	6	
Whooping-cough	1,891	62	335	52	58	4,334	376	606	27	55

DEATHS in Great Towns	1951					1950				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria	0	0	0	0	0	1	1	0	0	0
Dysentery		0		0			0		0	
Encephalitis, acute		0			0		0			0
Enteric fever	0	0	0	0		0	0	0	0	
Infective enteritis or diarrhoea under 2 years	13		1	0	0	9		6	2	0
Influenza	6	0	1	0	1	24	3	6	2	0
Measles		0	1	0	0		0	0	0	0
Meningococcal infection		0	1				2	1		
Pneumonia	156	23		15	4	207	26		9	8
Poliomyelitis, acute	4	1			0	6	0			0
Scarlet fever		0	0	0	0		0	0	0	1
Tuberculosis:										
Respiratory	119	10	16	3	8	164	16	33	7	10
Non-respiratory		5	3	0	1		2	3	1	3
Whooping-cough	3	1	0	0	0	5	0	0	0	0
Deaths 0–1 year	203	31	22	4	9	210	31	47	9	15
Deaths (excluding stillbirths)	4,530	680	548	124	168	5,321	819	736	159	183
LIVE BIRTHS	6,113	1019	779	217	365	6,543	1062	800	185	293
STILLBIRTHS	180	19	16			188	28	24		

* Measles not notifiable in Scotland, whence returns are approximate.
† Includes primary and influenzal pneumonia.
§ Includes puerperal pyrexia.

Medical News

Heberden Society Dinner

For the first time, it appears, the Royal College of Physicians opened its doors to strangers when it allowed the Heberden Society to hold its annual dinner at the College on December 7. If this successful experiment is repeated it may be hoped that the College will open its doors still wider and put on display its Heberden memorabilia. Professor Sir Henry Cohen, the president of the Society, was in the chair, and after he had proposed the toast "The Heberden Society," the health of the guests was proposed by Lord Webb-Johnson in a speech that delighted the audience with its wit and good humour. Extending a special welcome to the Marquess of Salisbury, he said it was right and proper there should be a concentration of Liverpool at the dinner: Lord Salisbury was the new chancellor of Liverpool university, and a distinguished representative of a noble house that from generation to generation had given great service to the country. In welcoming Sir Hartley Shawcross, Lord Webb-Johnson regretted the sudden change of Government, for otherwise Sir Hartley might have nationalized crime to show it did not pay. Lord Webb-Johnson, with sad tales of women famous in history, greeted the ladies present and in particular Miss Patricia Hornsby-Smith, Parliamentary Secretary to the Ministry of Health. Replying for the guests, Miss Hornsby-Smith said that the Heberden Society and the Ministry of Health both wanted to fight the same enemy —the rheumatic diseases. At the Ministry she was beginning to learn the difference between a physician and a surgeon: "You are all at heart physicians, and surgeons are physicians who operate." William Heberden, she had been told, went to Cambridge at the age of 14, was a Fellow of the College of Physicians at the age of 36, had nine children, and died at the age of 91. Turning to Lord Webb-Johnson, she remarked that, if it was true a woman was as old as she looked, a man was old only when he stopped looking. In his toast "The President," Lord Salisbury paid a great tribute to Sir Henry Cohen as physician. The outlook of doctors, he said, was fundamentally different from that of politicians. Medicine was becoming an exact science. Politics was not a science, was not exact. The lot of a medical man was infinitely preferable. In a felicitous reply Sir Henry Cohen observed that the physician concerned himself with the whole of the art of medicine. Medicine was divided into seven categories. One of these was therapeutics, and one-seventh of therapeutics was surgery. Therefore the surgeon was equivalent to one forty-ninth of a physician. He thanked Dr. Russell Brain, who was among the guests, for allowing the Heberden Society to dine within the venerable walls of the College of Physicians. Sir Henry then paid his tribute to the executive committee of the Society, to the treasurer and the secretary. Finally, he observed that in recent years the *Annals of the Rheumatic Diseases*, with which the Society is linked and which is published by the B.M.A., had gone from strength to strength, and was now unrivalled as a journal in this field.

A Book for Christmas

50 Years of Medicine, containing in book form articles surveying the progress of medicine and surgery during the first half of this century which appeared in a special number of the *Journal* last year, is again available. Very pleasantly brought out, and handsomely bound, not only does it look impressive but the information it gathers together is useful and enlightening, and is of interest to both lay and medical readers. Over 300 pages of text, a complete index, and 32 illustrations make this a valuable book to have, and, incidentally, an excellent Christmas present. Costing 15s., *50 Years of Medicine* may be obtained through booksellers, or direct (post free) from the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1.

Princess Elizabeth Honorary F.R.C.S.

At a ceremony at the Royal College of Surgeons of England on December 5 Princess Elizabeth was admitted to Honorary Fellowship by the President, Sir Cecil Wakeley, in the presence of the Presidents of the other royal colleges, the Minister of Health, and many eminent men. The Queen is already an Honorary Fellow, and the King is Visitor of the College.

American Scholars in Britain

A number of American scholars have recently arrived in the United Kingdom under the auspices of the United States Educational Commission to pursue studies in various branches of learning for approximately nine months. It is the wish of the Commission that these Americans should have opportunities of meeting as many British men and women as possible who have similar interests. Five of them are connected with medicine; they are Dr. W. R. Christensen, who will conduct research in the new techniques of Koller and Smithers applied to carcinoma of the cervix, at the Royal Cancer Hospital, London; Dr. R. A. Dudley, who will undertake radiotherapeutic work at the London Postgraduate Medical School; two will work at Cambridge, Professor J. T. Edsall lecturing on the physical chemistry of large molecules, and H. C. Anderson investigating the C-reactive protein in the rabbit. Professor R. V. Platou will lecture to students and postgraduates on child health and paediatrics.

Parkes Museum of Hygiene

The museum, which has been closed for redecoration and repairs, is now open again to visitors, on Monday to Friday from 10 a.m. to 5 p.m., and on Saturday from 10 a.m. to 12.30 p.m. Tutors and others wishing to bring parties of students to the museum should apply in writing, and not by telephone, at least a week before their intended visit, stating the date and time at which they wish to come. This advance information is necessary to avoid the inconvenience to students of having several large classes in the museum at the same time. Applications should be addressed to the secretary, The Royal Sanitary Institute, 90, Buckingham Palace Road, London, S.W.1.

"Help Your Teeth Help You"

The Ministry of Health has had produced a set of 12 pictorial display panels on dental care to emphasize three simple rules for healthy teeth—eating the right food, cleaning the teeth properly, and visiting the dentist regularly. The correct way of brushing the outer and inner surfaces of the teeth is also shown. The display is being offered to hospital and local health authorities for free showing in out-patients' departments, clinics, and welfare centres, and is also touring factories, libraries, and schools in England and Wales.

North of England Obstetrical Society

A meeting of the society was held in Liverpool at the Medical Institution on November 23, the president, Dr. J. W. A. Hunter, being in the chair. Dr. C. J. Dewhurst and Dr. R. W. Burslem described two cases of massive hypertrophy of the breasts in pregnancy, Dr. E. Rawlings two cases of post-partum haemorrhage treated by hysterectomy, and Dr. J. Douglas two cases of obstetric nerve paresis. Dr. E. Parry Jones read a note on the definition of deep transverse arrest. Mr. D. C. Racker read a short paper on urinary tract obstruction in procidentia, with a note on treatment of procidentia in the aged.

Helping the Disabled

"Outwitting Handicaps" was the title given to the exhibition of aids for the disabled held on November 27 and 28 in the Goldsmiths' Hall, London, and gave the key to the whole display of gadgets designed to enable the disabled to lead normal, independent lives. Organized by the Central Council for the Care of Cripples, the exhibits were limited to devices for home use, and complicated surgical apparatus was excluded. Even so the range of exhibits was wide—stocking pull-ups and a knife-holder for hemiplegics, a walking aid for spastics (invented, incidentally, by the father of a spastic child who was unable to take a single step without support before the invention of the appliance), and more elaborate machines like a remote control typewriter and an automatic microfilm projection reading apparatus. A one-armed man demonstrated various industrial tools designed for use by the disabled, and there was a section devoted to office equipment for blind and handless persons.

Emergency Bed Service: Applications and Admissions

During the seven days ending December 9 the number of applications made by doctors to the London Emergency Bed Service for admission of patients was 987, of whom 92.9% were admitted.

Mr. V. B. Green-Armytage and Dr. A. H. Galley are touring Pakistan Ceylon, and Burma for the British Council to perform demonstration operations showing the latest British methods in gynaecological surgery.

COMING EVENTS

Lecture at the Maudsley

A public lecture will be given at the Maudsley Hospital, Denmark Hill, London, S.E.5, by Professor T. Newcomb, of the University of Michigan, on "Role Playing as an Explanatory Concept in Social Psychology" at 2.15 p.m. on Thursday, December 20. All interested are invited to attend.

International Congress of Oto-neuro-ophthalmology

The 17th international congress will be held at Lisbon and Estoril from April 22 to 26, 1952. Papers will be presented on the value of angiography in oto-neuro-ophthalmology and on cranial O.N.O. disorders of cervical origin. The registration fee will be 300 Portuguese dollars, and full details may be obtained from the general secretary, Professor Diogo Furtado, Serviço de Neurologia, Hospital dos Capuchos, Lisbon.

British Association of Urological Surgeons

The annual meeting will be held in London, June 26–29, 1952. Provisional arrangements so far include the annual dinner on June 26, a discussion on the late results of uretero-colic anastomosis, and various short papers and films. Members and associate members who wish to read short papers are asked to submit the titles to the hon secretary, Mr. A. W. Badenoch, British Association of Urological Surgeons, 45 Lincoln's Inn Fields, W.C.2, before December 31.

First International Congress of Medical Librarianship

It is proposed to hold an international congress in London in July, 1953, and Sir Cecil Wakeley will preside. The programme will include formal sessions for the reading and discussion of papers, visits to medical libraries, and social functions. It is hoped also to have in connexion with the congress an exhibition of medical books and periodicals and library equipment. All those actively engaged or interested in medical librarianship and bibliography throughout the world are invited to participate. Requests for further information may be addressed in advance to the honorary secretaries, First International Congress on Medical Librarianship, c/o The London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C.1.

SOCIETIES AND LECTURES

A fee is charged or a ticket is required for attending lectures marked ●. Application should be made first to the institution concerned.

Monday

ROYAL EYE HOSPITAL, St. George's Circus, Southwark, London, S.E.—December 17, 5 p.m., *"The Care and Treatment of the Myopic Patient,"* by Dr. T. H. Whittington.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, London, W.—December 17, 5.30 p.m., *"British Anti-lewisite (Illustrated)—The Biochemistry of Arsenic,"* 1st Harben Lecture by Professor R. A. Peters, F.R.S. (See also December 18 and 19.)

Tuesday

●INSTITUTE OF DERMATOLOGY, Lisle Street, Leicester Square, London, W.C.—December 18, 5.30 p.m., *"Tuberculosis,"* by Dr. W. N. Goldsmith.

●ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East, London, S.W.—December 18, 5 p.m., *"The Newer Anti-biotics,"* by Dr. C. Wilson.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, London, W.—December 18, 5.30 p.m., *"British Anti-lewisite (Illustrated)—Dithiols as Antidotes,"* 2nd Harben Lecture by Professor R. A. Peters, F.R.S. (See also December 17 and 19.)

Wednesday

●INSTITUTE OF DERMATOLOGY, Lisle Street, Leicester Square, London, W.C.—December 19, 5.30 p.m., *"Histopathology—Inflammation,"* by Dr. J. O. Oliver.

INSTITUTE OF UROLOGY.—At St. Paul's Hospital, Endell Street, London, W.C., December 19, 4.30 p.m., *"Stress Incontinence in Women,"* by Mr. Harland Rees.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, London, W.—December 19, 5.30 p.m., *"British Anti-lewisite (Illustrated)—Developments and Applications,"* 3rd Harben Lecture by Professor R. A. Peters, F.R.S. (See also December 17 and 18.)

ROYAL MICROSCOPICAL SOCIETY, Tavistock House South, Tavistock Square, London, W.C.—December 19, 5.30 p.m., *"A Vector Theory of Phase-contrast and Interference-contrast,"* by Dr. R. Barer.

Thursday

BRITISH INSTITUTE OF RADIOLOGY, 32, Welbeck Street, London, W.—December 20, 8 p.m., ordinary meeting. *"The Diagnostic Use of P^{32} in Neurosurgery,"* to be opened by Mr. T. P. Morley and Dr. C. W. Gilbert, Ph.D.

EDINBURGH CLINICAL CLUB.—At B.M.A. Rooms, 7, Drumsheugh Gardens, Edinburgh, December 20, 8 p.m., *"Some Diagnostic Problems in Paediatric Medicine,"* by Dr. E. F. Dott.

Friday

BRITISH INSTITUTE OF RADIOLOGY, 32, Welbeck Street, London, W.—December 21, 5 p.m., meeting of medical members; 6.30 p.m., *"The Use of P^{32} Incorporated in a Plastic for Superficial Beta Therapy,"* by Dr. W. K. Sinclair, M.Sc., Ph.D.; *"The Use of Fission Products in Surface Applicators,"* by Mr. H. F. Freundlich, M.A.

FACULTY OF RADIOLOGISTS: RADIODIAGNOSIS SECTION.—At Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C., December 21, 2.15 p.m., *"Radiology in Diseases of the Prostate,"* discussion to be opened by Dr. J. H. Middlemiss and Mr. Ashton Miller.

●INSTITUTE OF DERMATOLOGY, Lisle Street, Leicester Square, London, W.C.—December 21, 5.30 p.m., *"Tuberculosis,"* clinical demonstration by Dr. W. N. Goldsmith.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Bartlett.—On November 29, 1951, at Bristol Maternity Hospital, to Anne (formerly Cousins) M.B., wife of Charles Bartlett, F.R.C.S., a second daughter.

Martin.—On November 24, 1951, at The London Clinic, to Irene (formerly Schmeidler), wife of Dr. M. Mencer Martin, a brother for Jennifer—Nicholas Robin.

Pack.—On November 28, 1951, at Andover, Hants, to Dr. Mary Pack (formerly Stanton), wife of Dr. Gordon J. Pack, a daughter—Susan Frances.

Sinclair.—On November 26, 1951, at Fernwood House, Newcastle-upon-Tyne, to Ruth, wife of John A. Sinclair, The Manor House, Houghton-le-Spring, Co. Durham, a daughter.

DEATHS

Davidson.—On December 3, 1951, at 6, The Square, Melrose, Roxburghshire, Herbert John Davidson, *M.C.*, M.B., Ch.B.

Dick.—On December 3, 1951, at St. Nicholas Vicarage, Blundellsands, Lancs, John Stavely Dick, M.B., B.Ch., late of Harpurhey, Manchester.

Gordon.—On November 29, 1951, at the Gardner Institute of Medicine, Thomas Landles Gordon, M.B., F.R.C.S.Ed., F.R.F.P.S., of 9, Boclair Road, Bearsden, Glasgow, aged 49.

Masters.—On November 4, 1951, at Umtali, Southern Rhodesia, Victor Fanstone Masters, M.R.C.S., L.R.C.P., aged 34.

Oliphant.—On December 5, 1951, at The Grange, Bucksburn, Aberdeen, Edward Oliphant, M.B., C.M.

Thornton.—On December 4, 1951, at Hartfield, Sussex, George Lestock Thornton, C.B.E., *M.C.*, T.D., M.R.C.P., M.R.C.S., formerly of Exmouth, Devon, aged 79.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Toxicity of Weed-killers

Q.—*Certain selective weed-killers have plant hormones as their active principles. Are these substances harmful to man?*

A.—There are two classes of weed-killers. The so-called selective weed-killers suppress the growth of certain plants but have no harmful effect upon others. It is possible, therefore, to apply to a field a substance which will destroy weeds, such as charlock, poppy, mayweed, and similar pests, without interfering with the growing crop. The choice of weed-killer depends upon the species of weeds and the host crop. Sulphuric acid, certain copper compounds, and aromatic nitro-compounds such as dinitro-*ortho*-cresol (D.N.O.C.) and dinitro-secondary-butyl-phenol (D.N.B.P.) are examples of selective weed-killers. Bidstrup and Payne (*British Medical Journal*, 1951, **2**, 16) have recorded the toxic properties of D.N.O.C. when used as a selective weed-killer in cereal crops, and D.N.B.P. may cause similar symptoms and signs of poisoning. In the past decade 2-methyl-4-chloro-phenoxyacetic acid (M.C.P.A.) and 2,4-dichloro-phenoxyacetic acid (D.C.P.A. or 2-4D), or the amine salts and esters of these, have been shown to act as selective weed-killers. Because these substances play a part in regulating plant growth they have been called plant hormones, and, as weed-killers, they are sometimes referred to as "hormone selective weed-killers." No toxic effects have been recognized in persons manufacturing or using hormone-selective weed-killers.

General weed-killers, which include the arsenicals, the chlorates, phenolic compounds, and petroleum oils, kill all plants to which they are applied. The use of this class of weed-killer is restricted to such sites as paths, roads, and railways, where it is desirable to suppress the growth of all vegetation. Symptoms and signs of arsenical poisoning may occur, and where lead arsenate is used both lead and arsenic poisoning may occur simultaneously.

Haemophilia and Minor Operations

Q.—*Where can I find information on the precautions to be taken before performing a minor operation on a haemophiliac?*

A.—On p. 9 of the book *"Any Questions?"* The book can be obtained for 7s. 6d. (postage 6d.) from the Publishing Manager, B.M.A. House, Tavistock Square, W.C.1.

Paroxysmal Tachycardia in Pregnancy

Q.—*Attacks of paroxysmal tachycardia (pulse 140 per minute), lasting 5 to 15 minutes, are occurring frequently by day and night in an otherwise healthy woman who is now seven months pregnant. The attacks started at the fifth month and make her breathless. Similar attacks occurred towards the end of a previous pregnancy, but not so frequently. What relationship has the pregnancy to these attacks? What is the prognosis? What treatment is advised?*

A.—The cause of paroxysmal tachycardia is unknown. It is not uncommon for attacks to become more frequent during pregnancy. Although the symptoms may be most unpleasant for the patient, if the paroxysms are short there are usually no serious complications. Prolonged attacks

may lead to heart failure, and in pregnancy they have been associated with foetal deaths; such attacks require treatment by rapid digitalization.

In the patient under consideration, small regular doses of quinidine up to 5 gr. (0.32 g.) three times a day may reduce the frequency of the attacks, and should not interfere with the pregnancy. An initial dose of 2 gr. (0.13 g.) should be given to test for sensitivity. A prolonged attack at the time of labour should be treated with digitalis.

It is assumed that the patient in question has been fully investigated for the presence of organic heart disease. In this connexion it should be noted that atrial septal defects easily pass unrecognized, and this condition is not infrequently associated with attacks of paroxysmal tachycardia.

"Latent Nephritis," Abortion, and Pregnancy

Q.—*(1) What is the significance of a low renal clearance test (on two occasions, 25% and 35% of normal) in a woman 10 days after miscarriage in the absence of hypertension, albuminuria, or oedema? Is this sufficient evidence on which to base a diagnosis of latent nephritis? (2) Is latent nephritis a cause of recurrent abortion? (3) Is the existence of latent nephritis an absolute contraindication to pregnancy?*

A.—(1) The renal clearance test is unreliable unless the most stringent precautions are taken to exclude various sources of technical error. It is probably least reliable during and immediately after pregnancy, when bladder function may be disturbed. In the absence of any other evidence a low reading should not be accepted as indicating the presence of nephritis.

(2) No. Glomerular damage sufficient to cause abortion or other serious complication of pregnancy makes its presence known by albuminuria or other definite clinical manifestations.

(3) Few would now accept the existence of a condition which justifies the term "latent nephritis." The concept of occult or latent nephritis was introduced many years ago to account for recurrent toxaemia of pregnancy. It never had any sound pathological basis, and it is now recognized that recurrent toxaemia is probably explained on the basis of mild chronic hypertension or recurrent attacks of pre-eclampsia. Pregnancy is not contraindicated by a disease which does not exist.

Anaesthesia for Forceps Delivery

Q.—*What is the anaesthetic of choice for forceps deliveries (a) in hospital, and (b) in the home?*

A.—An efficient anaesthetic for forceps delivery is one that produces adequate relaxation of the muscles of the pelvic floor and perineum for the application of the forceps, without depressing the uterine muscle and without delaying good post-partum contractions. Recovery from the effects of the anaesthetic should be rapid, with little vomiting or general malaise. Needless to say, respiratory depression of the baby must not be caused.

No anaesthetic can be guaranteed to behave in this way, but excellent results are given by gas/oxygen/ether and by cyclopropane in skilled hands. In easier cases—e.g., low forceps delivery—gas/oxygen/trilene is effective. The particular choice will depend on the skill of the anaesthetist and on the equipment available. The simplest equipment of all is required for open drop ether. At least one analgesia device will deliver trilene/air in sufficient strength to produce anaesthesia for an easy forceps delivery in many patients. Open drop chloroform is widely used for this purpose too, but unless given with skill and for a short period of time only there is undoubtedly risk of overdose and delayed poisoning. In the most difficult forceps cases, and in hospitals only, small doses of a relaxant are a great help in allowing the blades to be applied, and do not appear to influence the respiration of the baby.

British Whooping-cough Vaccines

Q.—*I was interested to read in the "Journal" (1951, 1, 1463) of the improved whooping-cough vaccines. Apparently the vaccines prepared by the Michigan Department of Health were considerably more effective than the other vaccines tested. What is the most effective vaccine available in this country now?*

A.—In this country there is no officially accepted yardstick by which the efficiency of whooping-cough vaccines can be easily measured in the laboratory as there is for assessing the antigenic potency of diphtheria prophylactics. In the United States the mouse protection test is used for pertussis vaccines, but there is as yet no published evidence to show that this test will help to distinguish between the vaccines that give good protection and those that do not. However, British manufacturers have been given full details of the method of production of the Michigan State Laboratories vaccine, which gave the best results in the recently published Medical Research Council trials, and further trials are now being made with some British vaccines of this formula. No reports are yet available about the efficiency of these British vaccines.

NOTES AND COMMENTS

Foreign Clinics for Asthma and Bronchitis.—Dr. B. BENDKOWSKI (Barrow-in-Furness) writes: The explanation of the benefit which asthmatic patients derive from a stay in Switzerland ("Any Questions?" November 17, p. 1231) is not satisfactory. The statement that dust and pollen content of air diminishes with increasing height is not correct. As early as 1870, C. H. Blackley conducted several experiments in which he showed that at high altitudes (1,000 ft. (305 m.) to 1,500 ft. (457 m.)) the quantity of pollens in the air was 19 times greater than at the lower levels. He quotes, also, an observer who has seen snowfields on the higher Alps dusted with pollens. According to Hadley's law there are air currents in the atmosphere due to difference of temperatures. These air currents are capable of carrying dust, pollens, and spores to high altitudes and long distances. Radioactive clouds can be traced thousands of miles from the place of an atom bomb explosion. Pollens are not responsible for every case of asthma. Rackeman and Smith (*J. Allergy*, 1931, 2, 364) quotes 425 patients out of 1,074 who were hypersensitive to some foreign protein, and who had asthma on contact with it. The reason for the benefit which asthmatic patients derive from a stay in Switzerland is not easily explained, as it is difficult to explain why the attacks of asthma will stop after removal of an asthmatic patient from his home to hospital or convalescent home.

OUR EXPERT writes: It is true that the explanation of the beneficial effects of high altitudes on asthma is not a simple one, nor is it suggested that it benefits all cases. There can be little doubt that the air in alpine resorts contains less particulate matter than that at lower levels—this is not necessarily entirely due to the height above sea level, but may depend partly on the absence of large industrial concerns which emit irritating smoke. The pollen content of air in mountainous districts varies with the quantity of flowering grass in the immediate neighbourhood and upon convection currents: unpublished evidence is available to show that in some districts pollen counts are considerably reduced even a few hundred feet above the surrounding country. Experimental work in pressure chambers has also shown that a moderate reduction of atmospheric pressure is temporarily beneficial in asthma (Storm van Leeuwen, *Allergische Krankheiten*, 1926, Berlin; Järvinen, K. A. J., *Acta med. scand.*, 1951, **140**, 423). Nor would one deny that the holiday mood and consequent freedom from the cares of everyday life inspired by a stay in Switzerland play their part.

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